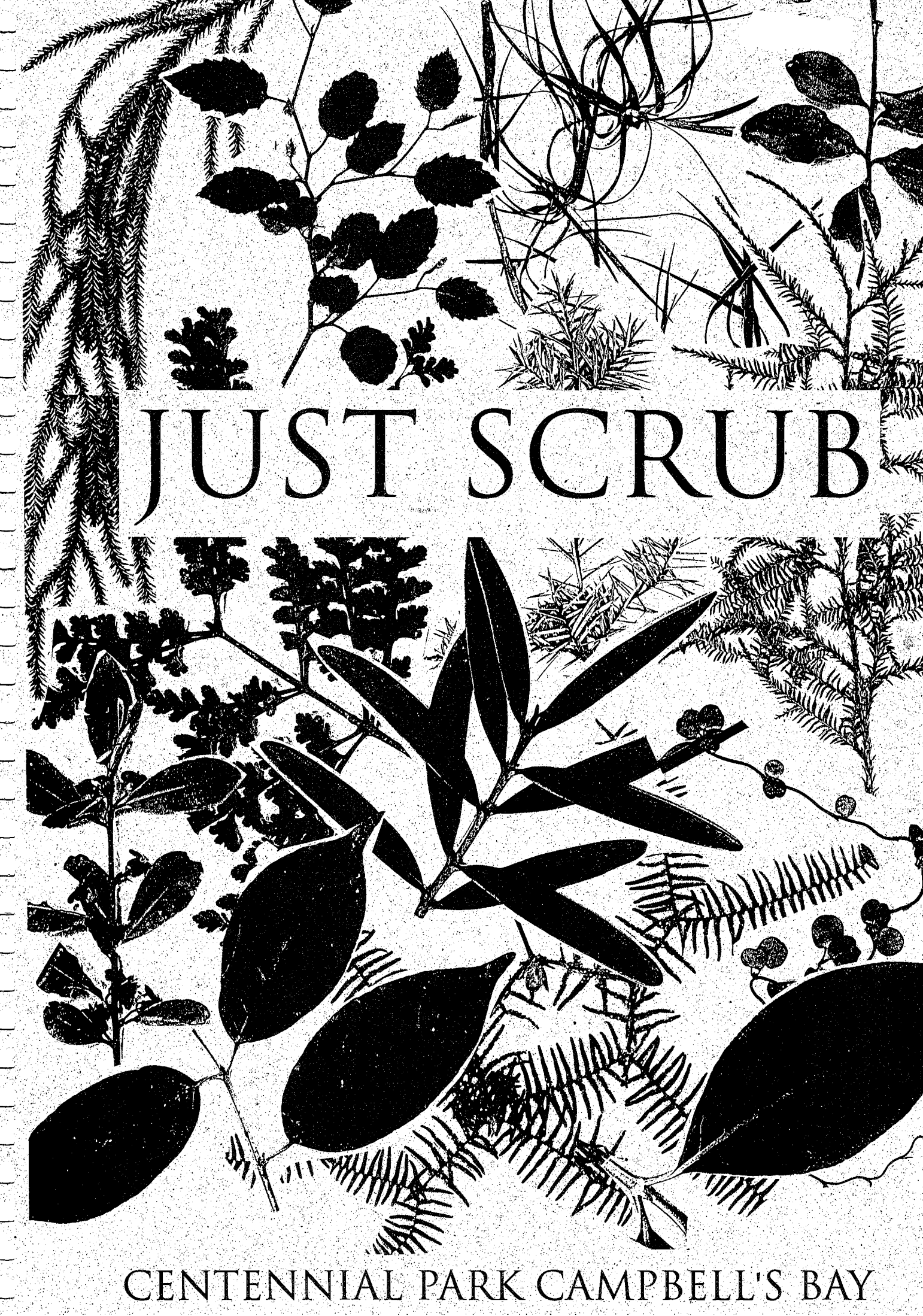
JUST SCRUB
CENTENNIAL PARK CAMPBELL'S BAY

JUST SCRUB

The history and natural communities of the
Bush at Centennial Park, Campbell's Bay

Prepared by the Centennial Park Bush Society
for North Shore City Council

1993

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JUST SCRUB

FOREWORD TO SECOND EDITION

The second edition of *Just Scrub* is published in response to continuing demand The only alteration to the text is the removal of the references to the Nature Trail Guide numbers following the original stations. As a description of a piece of gumland scrub ten years ago it is a valuable record to have. To bring it up to date it should be read in conjunction with the Nature Trail Guide.

The research for the Nature Trail Guide two or three years ago led us to cast a critical eye on the bush, to realise we had been walking around, eyes on the ground for secure footholds, not seeing what was going on above our heads. We were amazed at the height of the trees and then began to notice how species were changing . The real surprise came when we got towards the end of the Nature Trail to find it hard put to get even 50 stations where the old Guide had 75. Hence some spare stations were put in before the exit of the bush, using them to test what had been already learnt.

Above all we must remember that the bush is a living, developing entity, and that over the years it will change quite dramatically. The damper valleys are well on their way to mature forest with more deep bush species coming in - rata for instance. with the appearance of several young *Meterosideros robusta* and patches of epiphytic *M. perforata* on a tree fern trunk. And no doubt there will be other discoveries as the years go by.

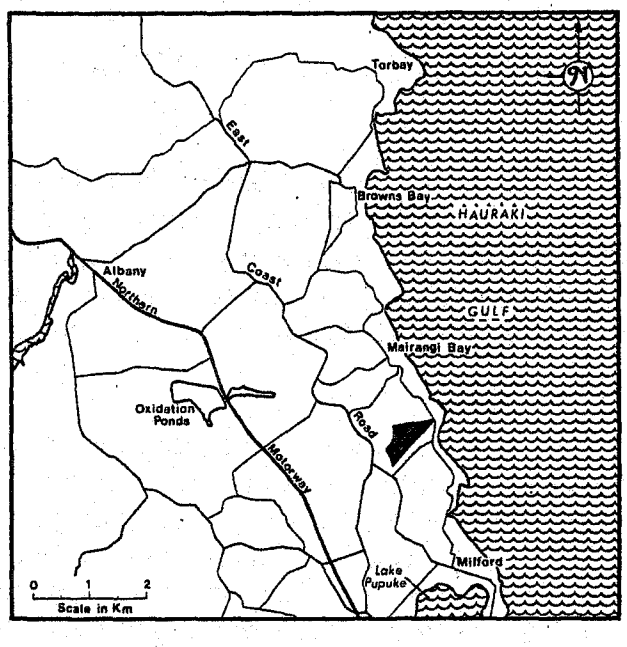
Disappearance of ground orchids near paths is almost inevitable. Muddy walking tracks have shifted foot-fall to the sides, usurping the edges just where orchids grew. Damage is also increased by dumping shifted material onto the sides of tracks. Undoubtedly the best provision is by the board-walks now being constructed, where orchids may well re-establish at the untrodden edge.

The existence of an on- going Bush Society should ensure that volunteers will carry their concern for the bush far into the future; so that this record of the passage from "just scrub" to a mature forest will be carefully continued.

PAT MORTON

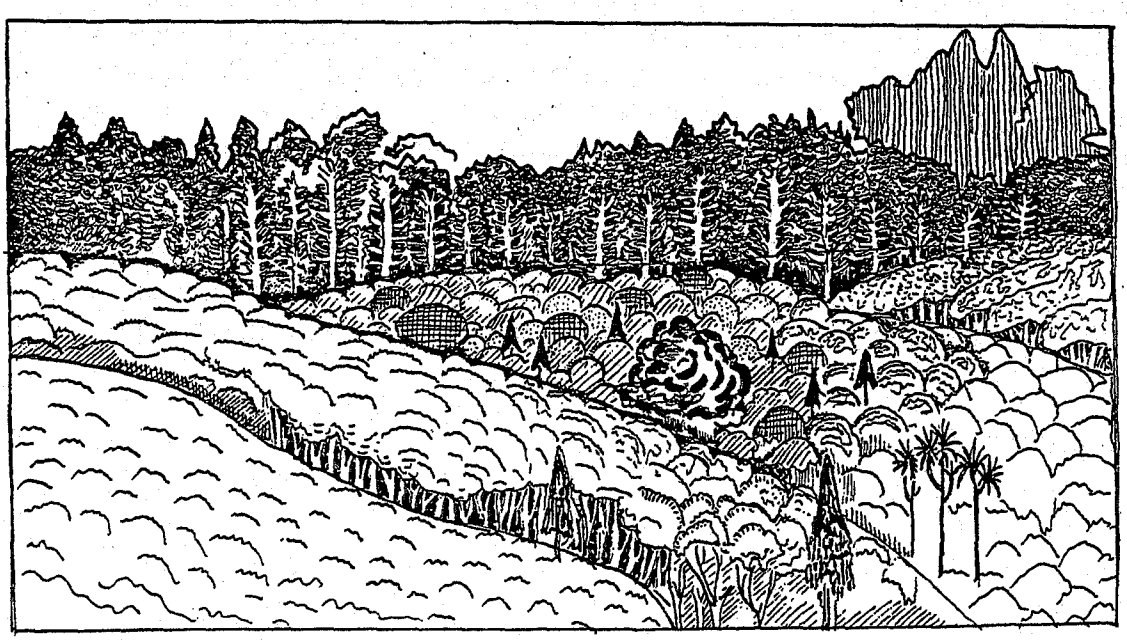
September 2003

LOCALITY MAP



PROSPECT OF THE BUSH AS SEEN FROM THE CARPARK AREA

The most advanced stages are along the stream edge, with the manuka nursery scrub (seen at the sides) replaced by numerous broadleaf species and young kahikatea and tanekaha. At the centre is the mature 'mother' kahikatea. The higher ground, towards the golf course, is pine-dominated. In front of it are the silvering trunks of ring-barked pines.



THE NATURAL HISTORY OF THE CAMPBELL'S BAY BUSH

The passer-by might hardly notice the bush of Campbell's Bay Centennial Park. Until it was threatened with cutting down few knew much about it. It is 'Just Scrub' in the sense of so many pockets of North Auckland bush. It is not distinguished bush. But its future is there, in its soil, its seed sources and its nursery of manuka scrub. The tragedy would not be the loss of the old trees, but the removal of that vital scrub which can bring the forest back.

With this realisation, the Bush Society came into being, entrusted by East Coast Bays City Council with the care of the old gumland bush and its adjacent grassland. The total area is c.28 hectares. The catalyst was the felling of half a hectare of scrub early one morning in November 1977, and the Council had the good sense to pause and think again. Already that felled piece is renewing itself: manuka sprang up within weeks and the understorey layer is beginning underneath it.

THE PAST

In the first days of Maori settlement, the North Shore was forested. On the higher slopes, through Albany and Okura, there was kauri and mixed podocarp-broadleaf. Where streams cut through to the beaches, the shores were fringed with pohutukawa, karaka and other coastal forest species. Over the flat and moister stretches, with good alluvium, grew forests with fine kahikatea, mingled with taraire and puriri and kohekohe, of which fragments remain at Awaruku and at Smith's Bush (Onewa Domain) today.

Where Centennial Park bush is now, kauri forest once stood. Whether it survived for the Europeans to fell is uncertain; the chances are it was lost through fire before they arrived. The first settlers in Auckland reported largely grass and scrub on the isthmus, and we have found no large stumps in the bush. It may have been cleared for farming at some stage, though there are no registered grazing leases. But we occasionally find remnants of old barbed-wire fences. One hundred acres was cleared for the golf club in 1918; local residents remember the rest as being quite low scrub in the 1920's. An army pill-box from World War II, now deep in the bush, must have been built in low scrub or even in the open. An ex-Home Guard member says they had to clear tree ferns only to preserve their line of sight.

Nowadays manuka comes away fast after clearing; this reported short scrub must have been the result of the infertile soil left behind by the kauri. Where a forest has contained much kauri or rimu, the topsoil is greyish and the subsoil hard and nutty and moderately acid, with nutrients leached away. This would describe the soil in the park today, but build-up of leafmould over the years has improved the fertility markedly.

The park was gazetted a recreation reserve in 1884 as a result of a Crown subdivision. First known as the Takapuna Domain, it was administered by the Commissioner of Crown Lands, and from 1895 by the Waitemata County Council, passing to the East Coast Bays Borough Council in 1955.

Little is known of its early history. Local residents remember quite large fires, which would account for the shape of some of the grassed areas. The pines would seem to have arrived about 40 years ago.

At the time of the New Zealand Centennial celebrations in 1940 the park was renamed. There was extensive planting, and residents remember walking in through knee-high scrub to plant trees in what is now the bush area.

The pohutukawa avenue along the southern boundary between Beach Road and Rae Road was planted by men coming back from the 2nd World War. People remember helping with the planting, and there were once names on these trees.

An interesting find is evidence of gumdiggers alongside the raupo swamp on the Kohekohe Track. There are two very clear hut sites, one with the remains of a sod fireplace, and as we explore further it would seem that there may have been quite a little settlement here at one time. As late as the 1920's

gumdiggers were living near the end of Park Rise selling their gum. Mr Sheriff was the local gum merchant.

After the flurry of activity in the 1940's, it seems that Centennial Park was largely left to its own devices, though Council must have mowed the grass regularly. There was a clear track on the north boundary during the 1960's, but this gradually grew over and was hard to locate in 1979 when we were putting in tracks. As the planted trees grew, the regenerating tree ferns and manuka surrounding them became more and more impenetrable - just the conditions needed for new bush to thrive. It is fortunate it was left so long before the threat of felling awakened people to its value; opened up any earlier it would hardly have survived the traffic through it today. We hope it has reached a stage when it will not be irreparably damaged by access to people. Helped along by our care and concern, it will produce a diverse and beautiful bush for the future, the largest in area of any North Shore reserve.

BIRDS

The Park is an increasingly good habitat for birds. Common native passerines are the pied fantail, wax-eye and grey warbler, and the tui, obviously responding to the planting of flax and berry trees. The shining cuckoo, a nest parasite of the grey warbler, is regularly seen. There has been one sighting of a pied tomtit. Larger natives are the wood-pigeon from time to time and kingfisher and morepork.

English introduced species common everywhere are blackbird, song thrush, starling, skylark and house-sparrow, as well as chaffinch, goldfinch, and greenfinch.

Many of our bush birds are new or long-standing Australian arrivals: Eastern rosella parakeet, the white-backed magpie, and in recent times the welcome swallow.

The pheasant and Californian quail are old-time inhabitants of the Park, as is the Indian myna. Now they have been joined by the spotted dove.

MANAGEMENT

This book was written with two purposes. First, to give a description of a Northland bush habitat, of regenerating gumland scrub with its typical species. This is a community fast disappearing because so few people think it worth preserving. Second, we hope, to encourage others by passing on the knowledge and experience we have gained from 15 years of conserving it, finding out from books, from experts and from the bush itself what was going on and how its regeneration could be advanced.

There are many advantages in having an organised Bush Society. It gathers together interested people with expertise at so many levels. Our members have included lawyers, planners, those with building skills, others with xerox and office facilities. Many from outside - botanists, horticulturalists, park managers and conservationists have willingly offered their own talents and advice.

250 Bush Society members have paid a small subscription that has kept us largely independent of the City Council in buying plants, fertiliser, tools etc., though the Council has constantly been supportive. Our own main input has been labour, that rapidly became more expert as we worked. There is a core of 5 or 6 that puts in a morning a week, and another group of 30 or so to be called on for working bees on occasional larger ventures. There has always been a good, strong spirit. Working bees have been enjoyable, and accomplished daunting projects in what seemed no time at all.

The Bush Society started with two aims:

(i) to encourage the best public enjoyment of the Park, with conservation always in mind;
(ii) to improve and enhance bush regeneration by planting and management.

Manuka scrub will regenerate good native bush even if left alone, provided there are suitable seed sources and invading weeds are kept at bay.

There are three stages: the establishment of the manuka nursery; the growing up of the shrub layer; and the ultimate appearance of larger trees. We have tried to reach the third stage as quickly as possible, to help nature along, cutting perhaps 100 years back to 30. So we have a strategy of thinning manuka rather than waiting for it to thin itself. The first small trees then seem to spring up almost overnight. Extra light and air alleviate manuka-scale infestation, and the black mould on the honey dew disappears, that previously so inhibited small plants under the manuka. Plenty of compost was used rather than waiting for litter to build up. Well grown trees could be planted instead of waiting for birds and wind to bring the seeds, with only a few finding suitable spots. Nature unaided can be profligate and very unhurried.

All this needed some policy decisions. The purist way would be to leave it alone, adding nothing that nature does not provide, and raising plants from local genetic stocks. But Centennial Park, isolated from other native bush and surrounded by houses, had suffered a lot of human intervention before we took over its care. Trees planted in the 1940's are now mature and seeding. Seeds drift over from gardens - the only way, we think, to account for the two seedling kauri discovered some years ago, and now approaching ricker size.

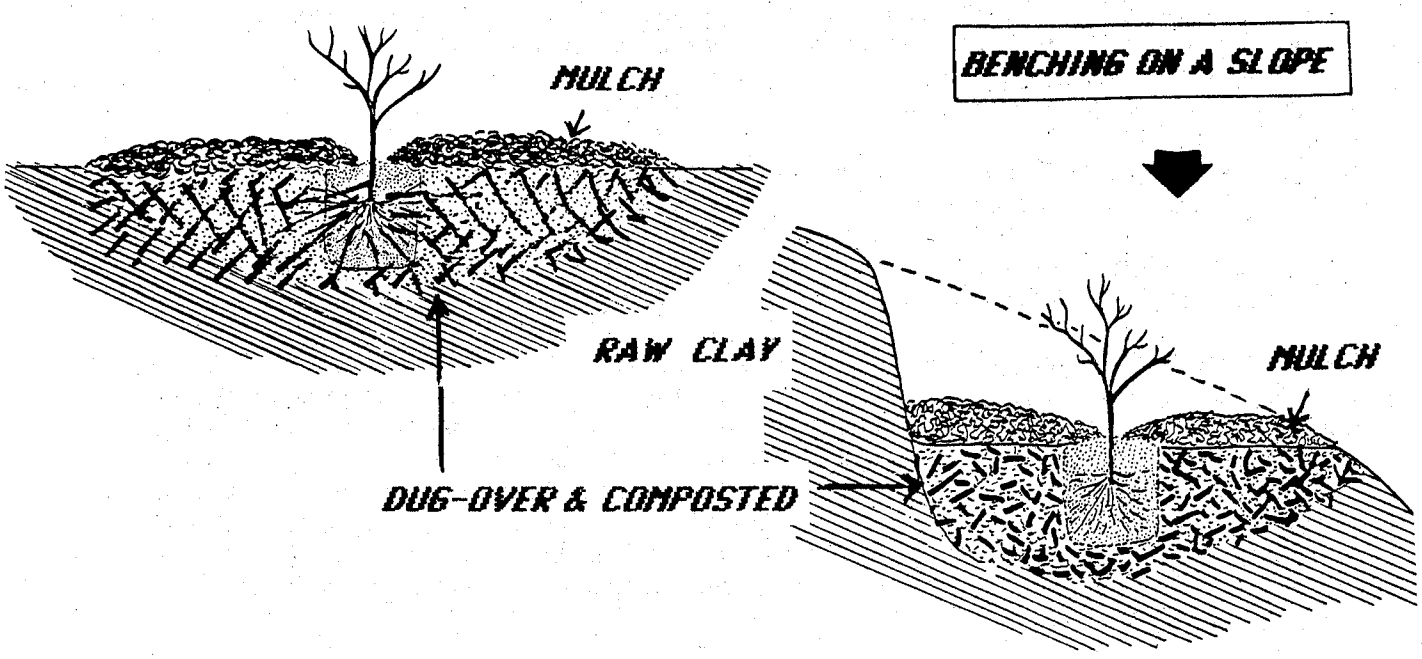
So we decided - with an already modified environment - to press ahead, adding species that could be expected in such bush. The important "natural" trees are kahikatea, tanekaha, kohuhu, karamu, hangehange, mapou, heketara, putaputaweta, five-finger, pigeonwood and mahoe (with just two kauri evidently self-established). We have added totara (from seedlings from the 1940 plantings), rimu, kauri, titoki, rewarewa (again with seedlings from earlier plantings), puriri, kowhai, matai, nikau, and some smaller species to thicken up the edges.

Our considered decision was to enhance and enrich, without protracted delay, so the bush could be entered and enjoyed. Left to itself, it would have struggled on, a closed wilderness, degraded by weeds and seen by the authorities as a prime candidate for clearing - as nearly happened. Today we have accomplished enough planting and tending for the indigenous bush to be viable, with its own internal sources of seed.

TENDING has now become our most important work: moving an obstruction, noting where weeds need attention, pruning round an emergent kauri. This is the sort of care no local authority could properly provide. It is an ideal role for residents who know their bush.

PLANTING METHOD

Here is perhaps the most important technique we have learnt in our bush management. It is vital to realise that the ground litter is the important layer for germination. Seedlings sprout and put down their roots here, not in the hard clay. When nurseryman Graeme Platt showed us this truth, we changed our planting method, with huge effects on the rate of growth. Some plants are already ahead of those put in a decade before, that have spent years struggling out of their planting holes. We no longer dig holes when planting; but shallow dig over an area as wide as energy allows - the wider the better. Compost and fertiliser are then incorporated, and the tree planted in the middle, not too deep and well firmed-in. Soil is then placed round it, left loose to let the rain in, and the whole area heavily mulched. Mulch is freely available in the bush and children attending working bees enjoy collecting it. Its use is very important.



WEED ERADICATION

A park in an urban area has far greater weed problems than more remote bush. Suburban gardens still have privet, ginger, acmena, cotoneaster, wild cherry, and those explosive Australians acacia and hakea. Pampas grass has seeding heads blowing in the wind. And people will at times dump rubbish at the bush edge, with honeysuckle, jasmine, convolvulus and tradescantia. The bush margins along the road need a wary eye kept on them.

PINES These have been the biggest invaders, first planted maybe under a work scheme in the depression of the 30's. Today's line of *Pinus elliottii* was put in to define one boundary of the original golf course lease. Other pines have seeded into marginal scrub, and have flourished where there is enough light. We acknowledge pines can give shelter and protection, but they also compete too greedily for sparse nutrients on this harsh gumland clay. When they go, the natives seems to surge ahead with a sigh of relief. So we have removed pines in the bush area, where they are not over-dense, leaving the close-growing bands to self-destruct with time. In the meantime they are a good environment for walking and tall *Pinus pinaster* near the golf course have encouraged superb growth of mamaku (black tree fern) as their handsome under-layer.

We felled pines where they could hit the ground outside the bush. The firewood was sold to buy trees. Pines to be removed inside the bush have been ring-barked, and left to fall in dry pieces, doing little damage around them. Some along the paths becoming dangerous have ultimately been felled into the bush when light and dry.

OTHER INVADERS Wind and birds have brought the two species of privet, brush wattle (*Albizia lophantha*), Sydney golden wattle (*Acacia longifolia*), two species of *Hakea*, pampas grass, gorse, cotoneaster, wild cherry and woolly nightshade. These are all aggressive and vigorous. It is hard toil controlling them in our 28 ha.

Early decisions were needed on the use of sprays and poisons. With little experience, we were first resistant to their use, both for our own well-being and the health of the ground. Ideally, all weeds might have been grubbed out, but only with a labour force greater than we could ever assemble. Our experiences of "make-work" schemes were not happy in weed eradication. So we began to use poisons, cautiously and warily. Making sure we covered ourselves adequately, we used sprayers at low pressure, close to the ground, or often small squirt-bottles, carefully controlled. Certainly we could not without judicious use of poisons have brought the bush to its clean condition today.

Here are some tips:

PINES should be ring-barked and painted with strong Round-up solution. They tend to heal up and keep growing, so need periodic checking. Pines do not regenerate under bush but will spring up (and can be easily pulled out) wherever there is light.

WATTLES can be ring-barked, painted and left to fall. The stumps seldom sprout again, though seed is long-lived, and will germinate almost everywhere, and we have pulled out hundreds. NEEDLE-LEAFED HAKEA needs the same treatment. The stumps don't sprout, nor are there many seedlings. Neither are they long-lived - they would probably die out naturally in vigorously growing bush. WILLOW LEAFED HAKEA is more difficult. It has most of the attributes of privet and should be so treated.

PRIVET is our very worst weed, once widespread in the Park. It is the hardest to kill. Chopped down, it sprouts again at once. Painted stumps recover in a year. Ring-barked, it takes no notice. It will flourish in the thickest bush. Birds take its copious berries everywhere. The only remedy is unrelenting war with constant spraying of each new sprout. Strong solutions of Roundup or Escort can be easily contained so as to do little damage to surrounding bush. Tordon brush-killer is more effective, killing a tree with a squirt into a machete cut.

PAMPAS GRASS (not the graceful native *Cortaderia* but the South American species) is an ongoing problem. Seed blows long distances. Removal from one patch doesn't mean it is beaten. It will sprout in bush, but tends not to prosper, being eventually overgrown when shaded. Clumps too large to be pulled or dug out can be effectively sprayed with Roundup into the middle, making sure the whole base is wetted. Remove flower heads or at least bend them down into the poisoned clump. Not a major problem if kept under pressure; the main difficulty with pampas is its growth in inaccessible places.

GORSE we have tended to ignore, unless it is crowding out some plant, or growing in the open or at the bush margin. It can sometimes double with manuka as a nursery crop for natives. To get rid of gorse, cut it across and paint the stump with Roundup five times stronger than the standard solution, plus Pulse. In addition, the seedlings which come up for years afterwards must be pulled out before they are too big. Areas cleared of gorse should be planted heavily and fertilised to encourage fast growth that will suppress return of gorse. Gorse is the greatest nuisance at the edge of bush. We have sometimes used flax to seal these edges, where however this cliff or swamp plant hardly looks right. Large *Gahnia* are ideal, but difficult to transplant. Best to find the natural edging native of the locality and plant it very thickly. We are currently trying *Hebe stricta* - easy to grow from tip cuttings.

GARDEN ESCAPES

Some of the most troublesome weeds are those that still get dumped in the Park including honeysuckle, *Tradescantia*, convolvulus, and Kikuyu grass. As the Park has been cleaned up, garden dumping has largely ceased from adjacent gardens. But vigilance is still needed with dumping from cars.

HONEYSUCKLE is a great smotherer of other plants, and most persistent. By cutting through the stems, the scrambling top will be killed. The stumps should be painted with double strength Roundup, and should then be watched for years. Every small slip left will re-sprout. We have dealt with honeysuckle so thick and impenetrable that it was impossible to cut, or save what was strangled beneath. The only resort was then the "scorched earth" policy: to spray it all and keep spraying for a couple of years. Once the tangle of dead vines breaks down little seedlings will spring up.

CLIMBING ASPARAGUS is a newcomer hard to control. Like honeysuckle it quickly covers a large area, leaping up tree bases and forming thick blankets. There are many stems and underground roots, too much to control by labour alone. Normal strength Roundup has eradicated Asparagus under one area of pines, with two sprayings that have not much damaged the surroundings.

GINGER eradication has been our greatest success story. Along the raupo swamp, on the Kohekohe Track, it used to stand shoulder high, and for years we though it ineradicable. A system had to be devised to remove it from amongst other plants we wanted to save. The manufacturer's advice to spray whole plants was thus impracticable. Cutting the stems as close to the ground as we could, we then squirted a mixture of Escort and Pulse (at twice the recommended strength) on to the cut stems and rhizomes within 15 minutes of cutting. The cut surface tends to seal off, so poison must be applied fast. Cold water dye may be added, to show up treated plants. Piles of cut stems are then thrown on the treated rhizomes, protecting the work against rain. This poison is slow-acting, taking up to a year to be effective. Part of its effectiveness is to poison the immediate soil against regrowth of rhizomes. This treatment succeeded well. Small seedling trees rapidly came away as soon as the heavy growth was removed; and within a year, seedlings had sprouted on mounds of rotting rhizomes.

JASMINE and CONVOLVULUS gradually give way to unrelenting pressure, cutting back the climbing stems and squirting with Roundup. Convolvulus in particular brooks no relaxation. It can kill quite big trees by smothering. Beautiful as are its blue flowers, their appearance year by year at the top of a tree must be the signal for renewed attack.

Centennial Park has many bulb species outside the bush that grow in great sweeps over the grassed areas and under the trees. Most are garden escapes from South Africa, that originated in early days of trading. We cherish them with their three months spring and summer cycle of flowering. The grass where they grow is left uncut from May to December.

Some bulbs are not so welcome. Three-cornered garlic will soon overpower the accepted species, and the common watsonia is fast becoming a nuisance over the grassy areas. Quite different from the garden escapes in the gullies, this has a long spike with a few apricot flowers, and bulbils all the way up. With both these undesirables, we are cutting off foliage with a weed-eater several times a year; it would be an achievement not to have to use poisons.

STRENGTH OF POISONS:	
Normal strength ROUNDUP:	10mls to 1 litre, plus Pulse as a wetting agent. This is doubled for hard to kill species and made five times stronger as a stump paint for gorse and privet.
ESCORT for spraying foliage:	2½ gm to 5 litres Plus Pulse
ESCORT for squirting on rhizomes is used double strength:	5 gm to 5 litres Plus Pulse

THE PICTORIAL KEYS

As far as possible, all the plants of the bush, herbs as well as trees and shrubs, are illustrated. The main exceptions are the mosses and liverworts (that we haven't had time to get to know) and the fungi.

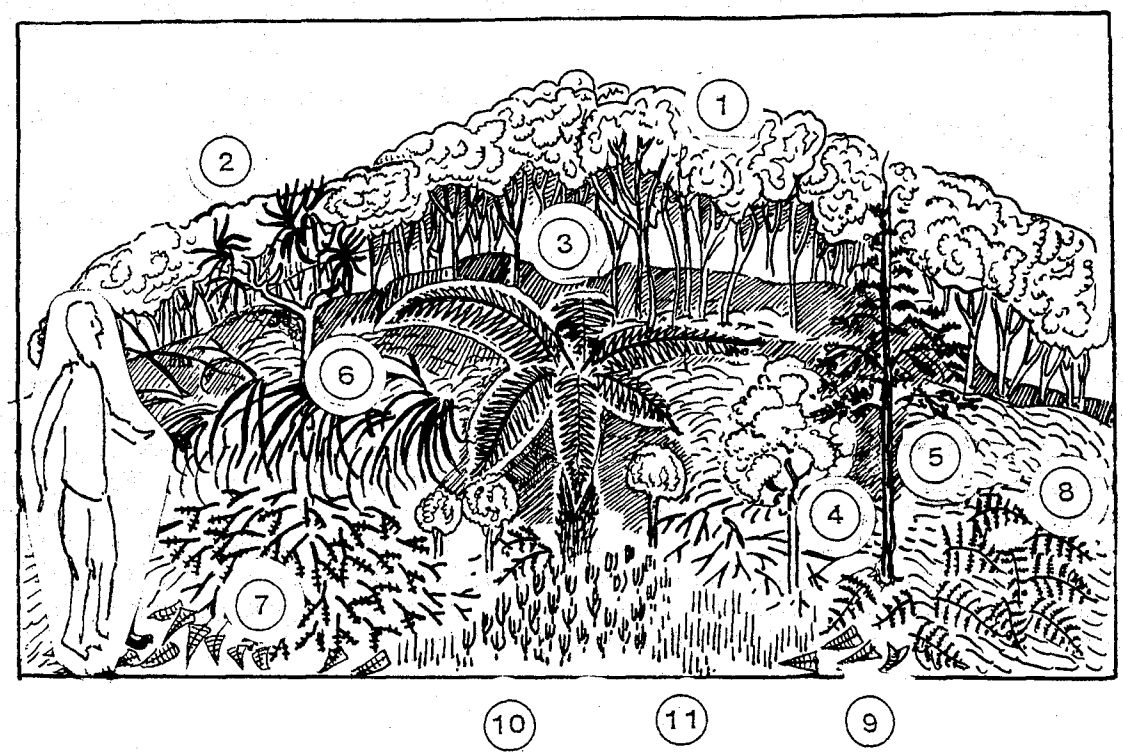
With the trees, leaves have been chosen, as better than flowers or fruits, for all-year-round identification. It is hoped the simple sketches will be sufficient. But remember that this Guide is not a full scientific authority and that final recourse ought to be made to the growing literature on the New Zealand Flora. The titles are cited on p.44.

The names of planted species are preceded by the letter (P); and where there are both planted and 'original' specimens they are signified thus : (OP)

The Keys should be used in conjunction with the Nature Trail leaflet. Where a plant occurs near a marker on the Nature Trail, the station number is on the right of the page where the plant is listed. it is easy then to compare the drawing with the growing plant.

NATURE TRAIL LEAFLET

This is available from a box on the southern end of the tennis pavilion or from the Aberdeen Road dairy. The trail entrance is near the bottom of Sandford Street, in a straight line from the two sewer interceptors. The Trail follows a loop, with 73 marker pegs; you arrive back where you began. Pause at each peg and read off the description of the plants alongside the number on the leaflet. We do not, of course, repeatedly describe what you have already seen; it is assumed that you are learning as you go along. With the Nature Trail showing you the growing plants and the Bush Guide illustrating and describing them further, it is possible to identify most of the species in the Reserve. Campbell's Bay Centennial Park is thus today a well-documented piece of bush. Real interest now attaches to finding species we have not yet seen. There must certainly still be some!



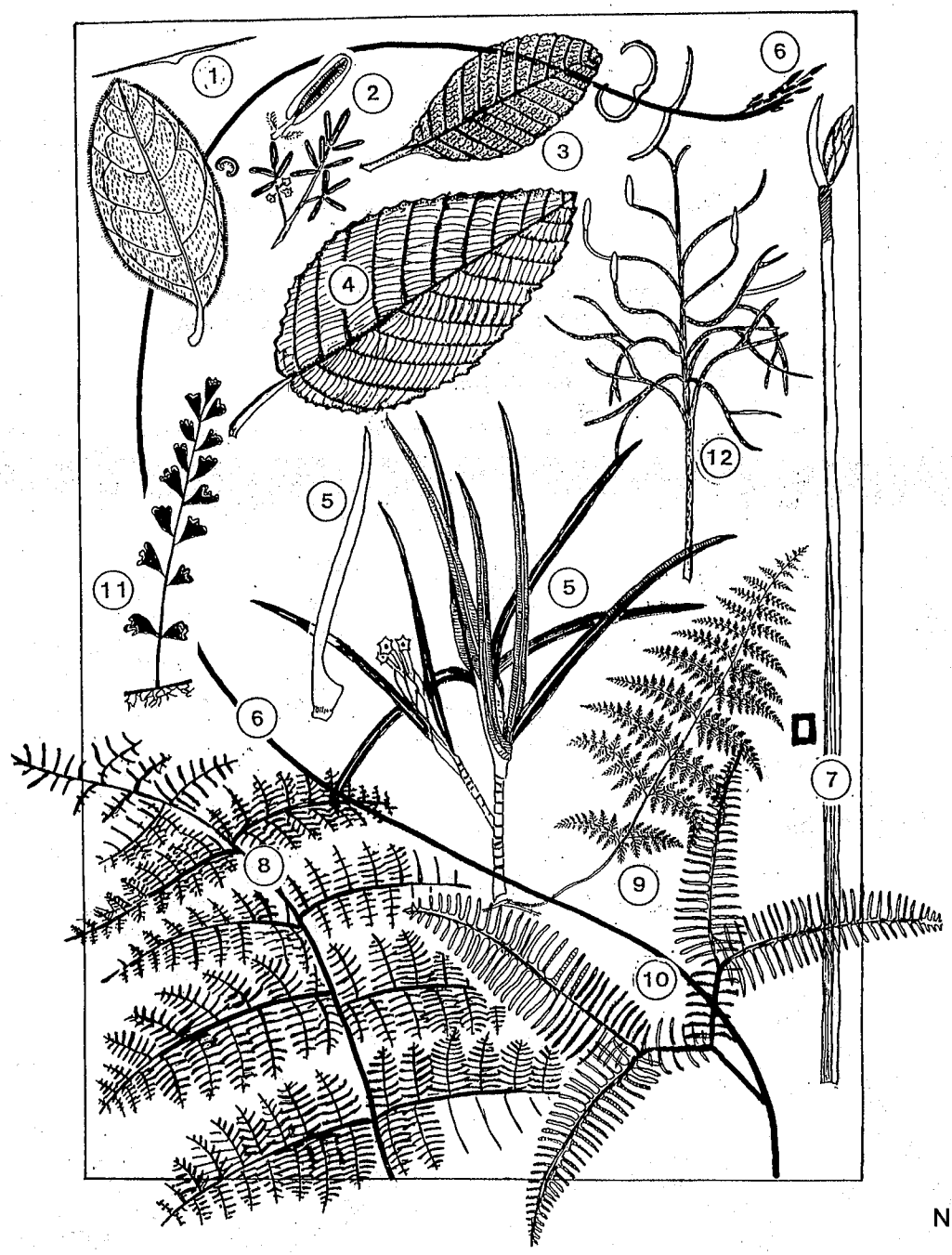
HABITATS

The northern boundary track and the cross track on the west (along the golf course edge) forming two limbs of the Nature Trail shows us the earliest stage in the return to a mature bush.

Much of it is already in low manuka cover (1) amongst which *Dracophyllum sinclairii* (2) is sparsely found. Silver fern (ponga) (3) already trunked, spring up in some numbers. A developing shrub layer contains mingimingi (*Leucopogon fasciculatus*) (4), and small planted kauri (5) are coming away fast.

Of the ground cover, the tallest is the native "cutty-grass" (*Gahnia setifolia* (6). The two most prominent ground ferns are *Gleichenia dicarpa* (7) and bracken (*Pteridium esculentum*) (8). Characteristic also are scented-fern (*Paesia scaberula*) (9) and the small *Lindsaea linearis*. The erect club-moss *Lycopodium deuterodensum* (10) is very typical. The common sedges are the long, trailing *Schoenus tendo* and the upright *Lepidosperma australe* (11).

This track is also *Pomaderris* country, with scrambling rolled-leafed tauhinu (*P. phylicifolia*) and big shrubs of kumarahou (*P. kumarahou*) and the rough-leafed tainui (*P.aspera*) A garden escape.

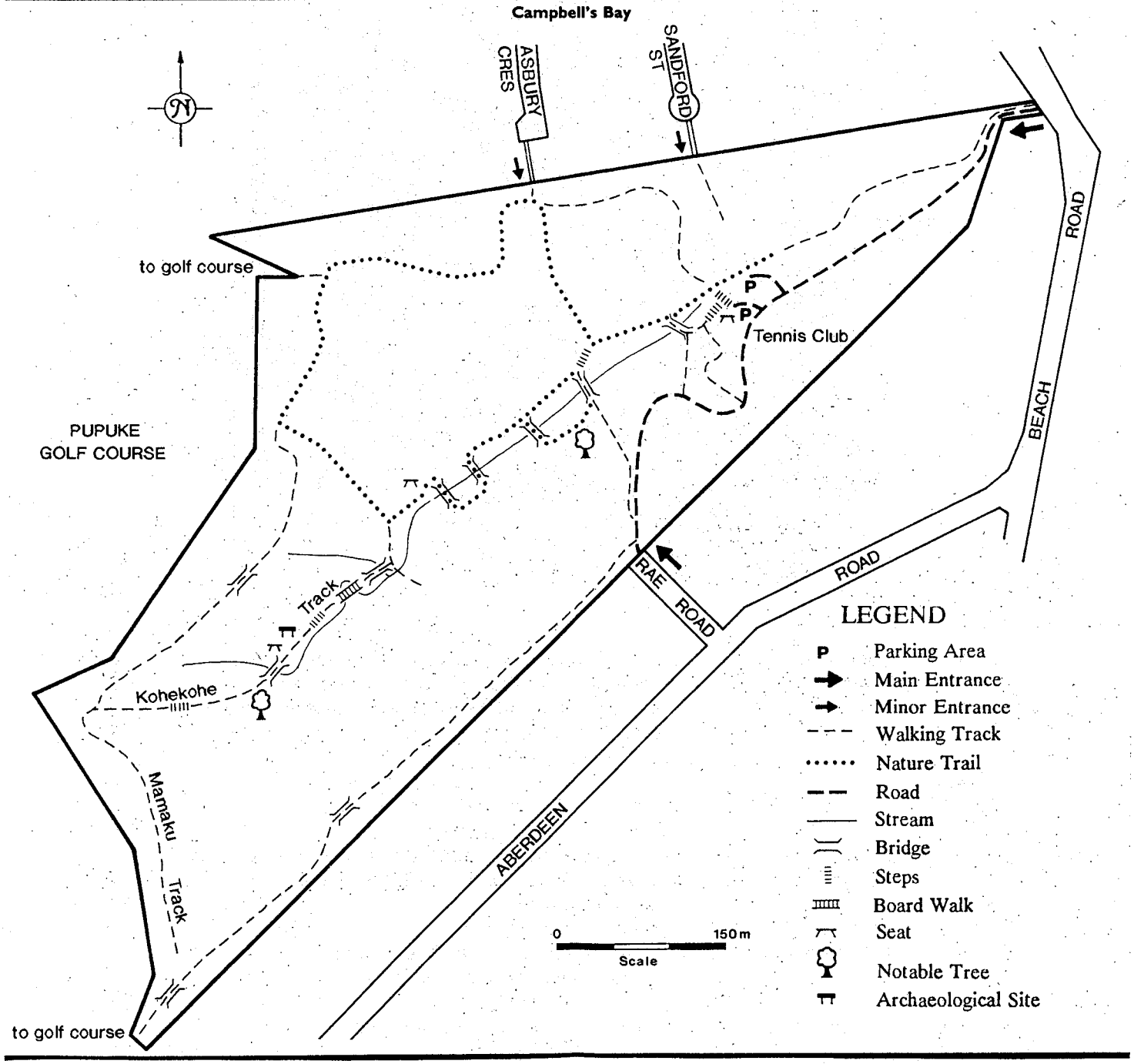


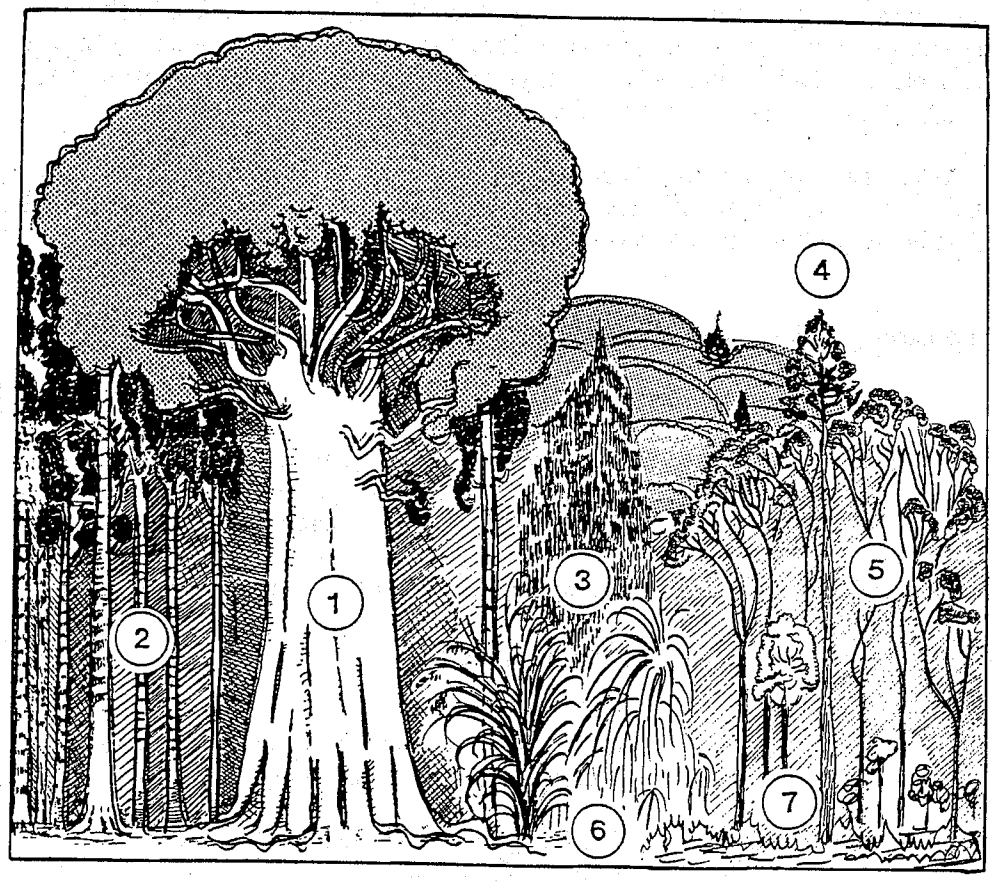
N.T. Peg

	1.	Kumarahou	(*Pomaderris kumeraho*) - tomentose ovate leaves	9
	2.	Tauhinu	(*Pomaderris phylicifolia*) - tiny rolled leaves	56
(p)	3.	Tainui	(*Pomaderris apetala*) - rough leaves, hairy beneath planted - roadside & grassed hill - outside geographic range	
	4.		*Pomaderris aspera* - garden escape	11
	5.	Dragon-leaf	(*Dracophyllum sinclairii*) - scrambling, with pointed leaves in tufts	62
	6.	*Sedge*	(*Schoenus tendo*) Long and tough, like thin tendons	53
	7.	*Sedge*	(*Lepidosperma australe*) Stiff and upright, square stemmed	64
	8.	Bracken	(*Pteridium esculentum*)	53
	9.	Scented fern	(*Paesia scaberula*) - harsh texture but delicate lacy appearance, in dryish places like bracken	53,67
	10.	Umbrella fern	(*Gleichenia dicarpa*) - more wiry or 'brackeny'	58
	11.	Slender lindsaea	(*Lindsaea linearis*) - a small creeping fern of clay	53
	12.	Club-moss	(*Lycopodium deuterodensum*) - with erect, candelabra branching)	59

1. The large kahikatea (*Dacrycarpus dacrydioides*)
2. Younger pole kahikatea
3. Young rimu (*Dacrydium cupressinum*)
4. Emergent tanekaha (*Phyllocladus trichomanoides*)
5. Manuka nursery scrub (*Leptospermum scoparium*)
6. Native "cutty-grass" (*Gahnia setifolia*)
7. Mingimingi (*Leucopogon fasciculatus*)

CENTENNIAL PARK





THE MATURING BUSH

The STREAM PATH, forming the south limb of the Nature Trail, is at a well-advanced successional stage. It is moister and well-shaded, with the manuka canopy now mostly gone, replaced by a profusion of other small trees, silver tree ferns, and groves of tall black tree-fern (mamaku), splendid by any standard. Along the Stream Path, as on the Kohekohe Trail, that branches from it, bush renewal has proceeded furthest. In some places, the original cover may never have been lost, but there is rather little evidence of old trees. The commonest gymnosperms are well grown, graceful tanekaha and slender adolescent kahikatea.

Our finest tree in the bush is the big kahikatea, the bush mother. Kahikatea are dioecious, having male and female flowers on separate plants, very common in New Zealand trees and shrubs. We are fortunate that this one is a female. Her progency are widespread in the bush. It is unusually mature shaped for its size. Estimated at 150 years, it would seem to have made most of its growth out in the open, after other trees had been cleared. Bush close around it would have constrained it to the pole-like growth of most kahikatea in their first century.

Another fine tree is the old kohekohe, at the end of the Kohekohe Trail. It is a seed source for many young (where the possums will allow). In the future it could have the same parent role as the old kahikatea with its progeny appearing all through the bush.

THE GYMNOSPERMS

The mature bush will one day be gymnosperm-dominated, with a diverse sub-canopy of angiosperm (broad-leaf) species. Pre-eminent in size should eventually be kauri, of which the bush had in 1977 only two naturally seeded specimens - seed probably blown in from someone's garden. A hundred or more have now been planted, the later-planted ones making particularly good growth, with growing knowledge of planting method and choice of site conditions.

Kahikatea and tanekaha are the most numerous species naturally recovering, both striking up tall through manuka. Rimu and totara are well represented, a legacy of the 1940's planting. Totara is now seeding naturally. A few kawaka (*Libocedrus plumosa*) have been planted successfully, as have matai and miro.

Note the distinctive juvenile leaf form in several gymnosperms, especially the growth habit of young matai.

N.T. Peg

(p)	1.	Kauri	(*Agathis australis*) - two small trees so far selfsown, others recently planted Female and male cones are shown	
(op)	2.	Kahikatea	(*Dacrycarpus dacrydioides*), with mature leaves and fruit	
	3.		Juvenile foliage	
	4.		Male cone	
			Compare two-rowed juvenile leaves from adult leaves of mature specimen off main path	18, 21
(p)	5.	Totara	(*Podocarpus totara*) - planted trees with little ones self-sown	71
	6.		Fruit	
(p)	7.	Matai	(*Prumnopitys taxifolia*) - white backs to leaves	
	8.		Fruit	
	9.		Juvenile	
(p)	10.	Rimu	(*Dacrydium cupressinum*) - adult	68
	11.		Juvenile foliage	
(op)	12.	Tanekaha	'Celery pine' (*Phyllocladus trichomanoides*) - note slender elegant shape; not true leaves, but 'cladodes' - flattened leaf like branches.	12
	13.		Juvenile	
(p)	14.	Kawaka	'Cedar'. (*Libocedrus plumosa*) - NZ cedar	72
	15.		Leaf detail	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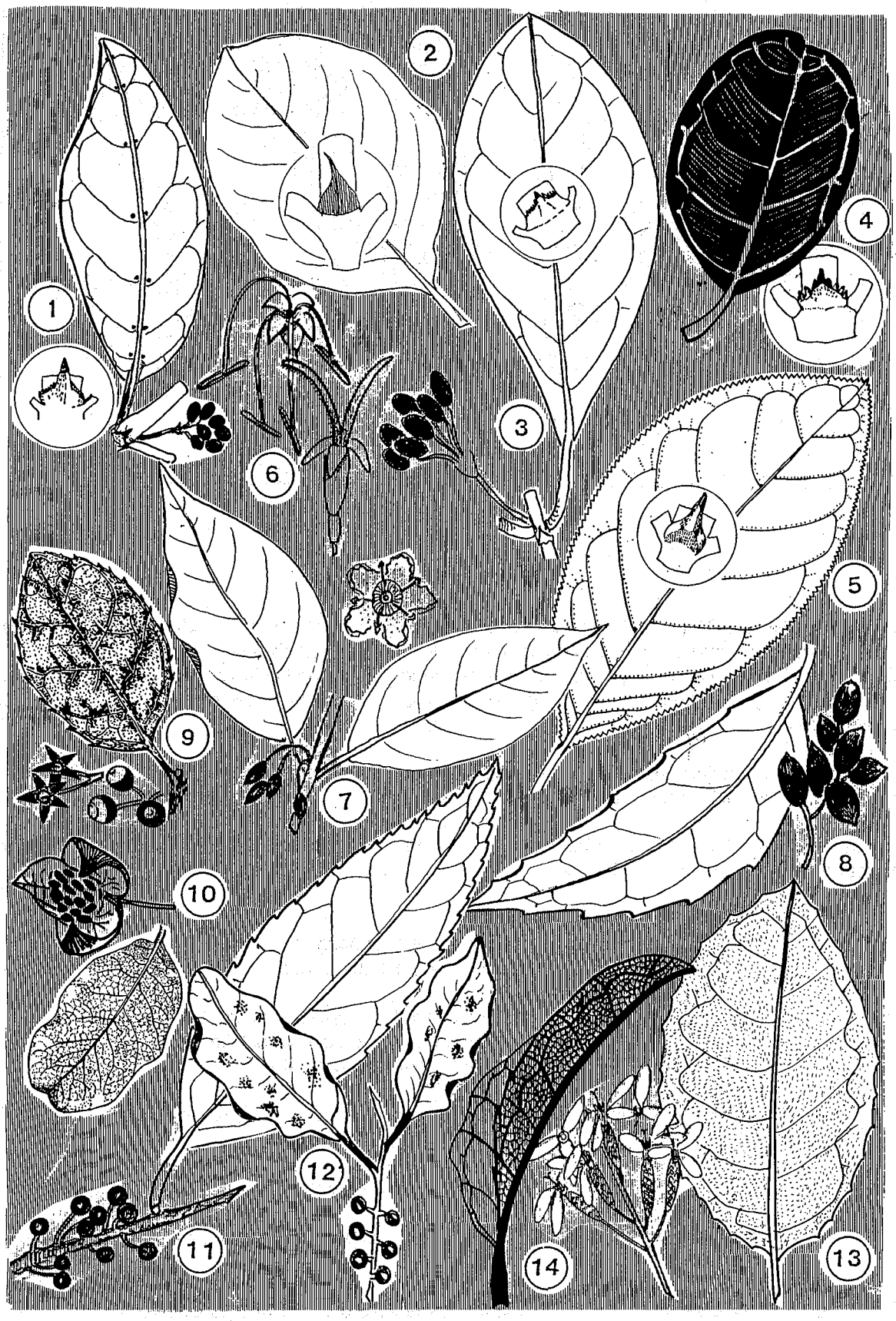
BROAD-LEAF TREES & SHRUBS

Here we have shown the principal broad-leaf (angiosperm) trees of the returning bush, a mixed company of associate species forming eventually a lower canopy, as the gymnosperms (especially kahikatea and tanekaha) strike up to maturity.

At present most numerous are well-grown kohuhu, mahoe, putaputaweta, pigeonwood (porokaiwhiri), with mapou, hangehange and akepiro of somewhat smaller stature.

As in any northern bush, the *Coprosma* species contribute notably to the shrub layer. Commonest in Centennial Park is *C. lucida*, followed closely by *C. robusta*. Scarcer is *C. grandifolia* (planted) with taupata (*C. repens*) included here for comparison, but found only where planted on bush edges. Note also the presence of *C. macrocarpa*, uncommon and local on the mainland.

				N.T. Peg
	1.	Karamu	(*Coprosma robusta*) - mid-rib, almost flush with blade smaller berries	11,30
	2.	Karamu	(*C. macrocarpa*) Large berries and more ovate leave	
	3.	Karamu	(*C. lucida*) - with raised mid-rib and larger berries	11,48
(p)	4.	Taupata	(*C. repens*) - leaves roundly ovate and shining	
(p)	5.	Raureka	(*C. grandifolla*) the largest leafed Coprosma leaves minutely serrate	
	6.	Coprosma flower	Male (above) and female (below)	
		All coprosma with stipule figured		
	7.	Hangehange	Pigwood (*Geniostoma rupestre*) Leaves pointed, silvery beneath, dry capsules not berries	13
	8.	Pigeonwood, Porokaiwhiri	(*Hedycarya arborea*) - leaves sometimes distantly toothed, polished	3, 19
	9.	Putaputaweta	(*Carpodetus serratus*) - small, serrate mottled leaves	30
(op)	10.	Kohuhu	(*Pittosporum tenuifolium*) - wavy leaves, distinguish by black twigs	6, 29
	11.	Mahoe, 'whitey wood'	(*Melicytus ramiflorus*) - tiny flowers and purple berries direct on branches (December)	1
(op)	12.	Mapou	(*Myrsine australis*) - wavy leaf margin, red twigs	8
	13.	Heketara	(*Olearia rani*) - leaves soft and mat-finished, irregular teeth, veins prominent beneath	44
	14.	Akepiro	(*Olearia furfuracea*) - leaves stiff and parchmenty, glossy finish with a few prickly teeth	47,57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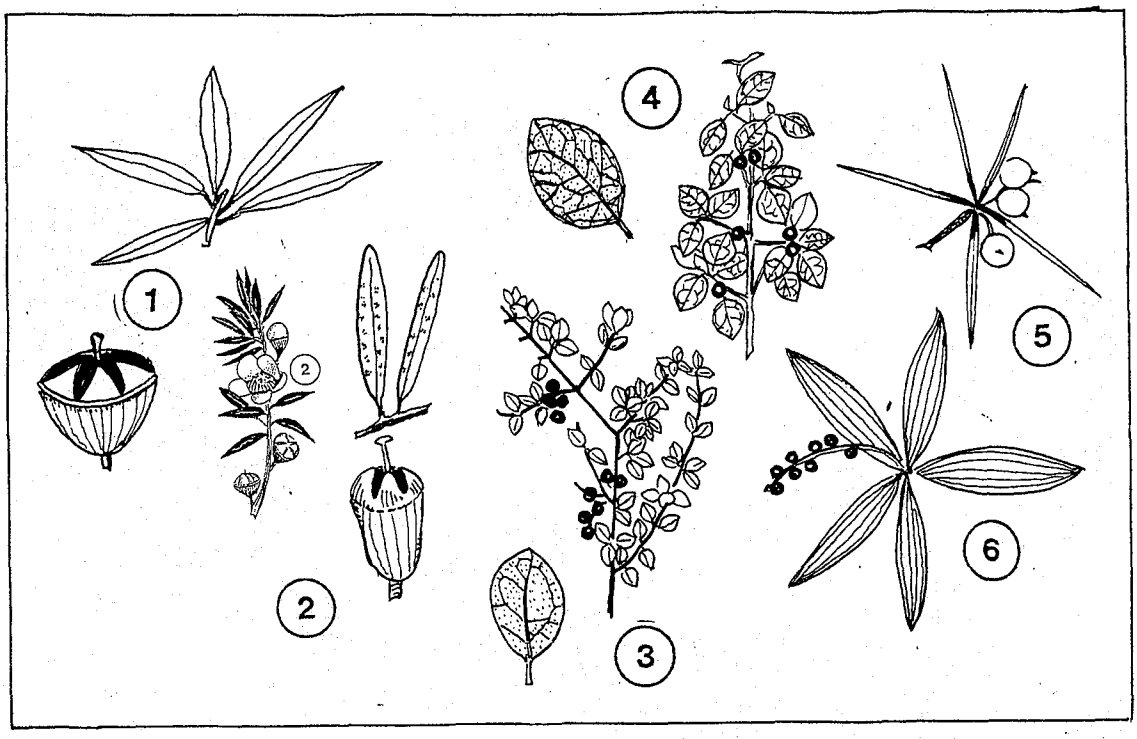


SMALL-LEAFED SHRUBS

Manuka and kanuka (both 'tea-tree') form the early nursery scrub of returning podocarp-broadleaf forest. Here the important nursery species is manuka alone, but a few kanuka are to be found amongst pines along the golf course boundary. More have been planted. Though having a function of nursery scrub, kanuka live longer. As the bush grows up they continue to grow up amongst the big ones, said to live about 250 years.

The peculiar divaricating habit in shrub-layer species is illustrated here by the two small-leafed *Coprosma* species *C. rhamnoides* and *C. areolata.*

The two mingimingi (*Leucopogon fasciculatus*) and the less common prickly mingimingi (*C. juniperina*) appear at an early successional stage.

N.T. Peg

	1.	Manuka	(*Leptospermum scoparium*) - leaves harsh, capsule broad	13,53
(op)	2.	Kanuka	(*Kunzia ericoides*) - leaves smaller and softer than manuka, capsule smaller and narrower, flowers in bunches	54
	3.	Bushy coprosma	(*Coprosma rhamnoides*) A spiky shrub with small round leaves	15
	4.		(*C. areolata*) Leaves slightly larger, veins netted	
	5.	Prickly mingimingi	(*C. juniperina*) - leaves needle-like, usually white berries	10
	6.	Mingimingi	(*Cyathodes fasciculata*) - leaves parallel-veined unscented (c.f. manuka) tiny flowers and red berries	10

Corokia -

COMPOUND LEAFED SPECIES

A diverse cluster of species can be brought together by their compound leaves (pinnate or palmate). The kohekohe is represented by one fine old tree, with a number of natural offspring, some of which have been re-located; others have been added by planting. Five-finger (*Pseudopanax arboreus*) is common, along with the scarcer houpara (*Pseudopanax lessonii*). Lancewood (*P. crassifolius*) is represented by juveniles and mature-leafed specimens. Wharangi and titoki have been planted.

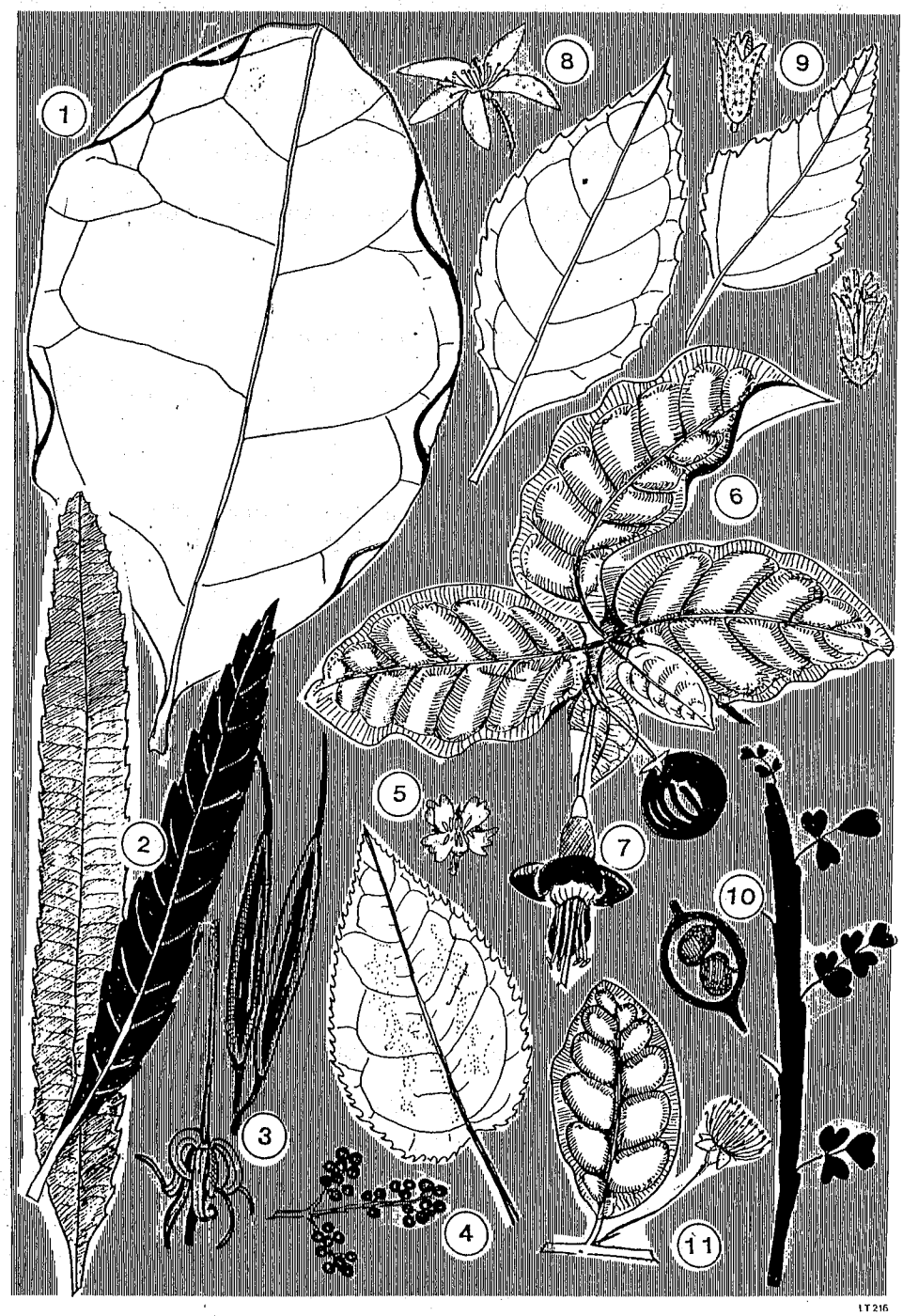
				N.T. Peg
	1.	Lancewood, horoeka	(*Pseudopanax crassifolius*) - Juvenile leaves rigid and linear;	
	2.		Mature leaf form	7,15
	3.	Houpara	(*Pseudopanax lessonii*) - leaves 3-5 foliate, longer and toothed Juvenile	45
	4.		Adult form - 3-foliate	
	5.	Five-finger	(*Pseudopanax arboreus*) - leaves 3-7 foliate	6, 73
(p)	6.	Wharangi	(*Melicope ternata*) - leaves in 3's, lemon-scented when crushed	
(op)	7.	Kohekohe	(*Dysoxylum spectabile*) - leaflets 3-4 pairs, flowers direct on branches;	
	8.		Flowers and fruit	32
(p)	9.	Titoki	(*Alectryon excelsus*) - pinnate leaves, black seed in scarlet aril;	69
	10.	Titoki	Fruit	

SUBORDINATE BROADLEAF SPECIES (I)

Three species on this page are natural denizens of the bush. Rangiora is on the Kohekohe Trail, with ramarama, the latter also on the stream bank by the big kahikatea. *Carmichaelia cunninghamii* is frequent along the stream track of the Nature Trail.

Puriri has been planted. Several rewarewa are self-established from one planted in the 1940's and others have been planted. Wineberry (makomako), lacebark (houhere), and manatu (lowland ribbonwood) have been planted.

				N.T. Peg
	1.	Rangiora	(*Brachyglottis repanda*) - leaf large, tomentose beneath: (may also be weakly toothed)	
(p)	2.	Rewarewa	(*Knightia excelsa*) - juvenile leaf linear and crinkly, adult shorter and stiffer	71
	3.		Flower and pod	
(p)	4.	Wineberry, Makomako	(*Aristotelia serrata*) - leaves long-petioled, deeply serrate	
	5.		Flower	
(p)	6.	Puriri	(*Vitex lucens*) - leaflets 3-5, red berries	65
	7.		Flower	
(p)	8.	Houhere	Lace-bark (*Hoheria populnea*) - strong, coarsely serrate leaves and flowers	
(p)	9.	Manatu	(*Plagianthus regius*) - smaller leaves, coarsely dentate, ovate lanceolate	
	10.	Native Broom	(*Carmichaelia cunninghamii*) - flat branchlets, virtually replace the small 3-foil leaves	31
	11.	Ramarama	(*Lophomyrtus bullata*) - recognised by 'blistered' leaves	23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SUBORDINATE BROADLEAF SPECIES (II)

Several of the species shown here have been planted outside the bush, or used to seal the bush edges against exotic invaders, like whau, the two *Griselinia*, tarata, toru, also karo and koromiko which also grow naturally.

Taraire has been planted within the bush, and also karaka. Karaka did not on the whole do very well for some years, but when planted in deep soil below Aberdeen Road it has thrived.

Kawakawa grows naturally below Sandford Street, and has also been planted.

Kowhai has been extensively planted along roadsides and bush edges.

Pohutukawa has been extensively planted: in the avenue along the southern boundary of the park during the 2nd world war, and also on roadsides.

				N.T. Peg
(p)	1.	Kowhai	(*Sophora microphylla*) - leaflets ovate	
(p)	2.	Pohutukawa	(*Metrosideros excelsa*) - planted outside the bush	63
	3.		Flower	
(p)	4.	Akiraho	(*Olearia paniculata*) - leaves undulate, leathery, tomentose beneath; roadside planted, geographically out of place	
(op)	5.	Koromiko	(*Hebe stricta*) - white flowered, opposite leaves	
(op)	6.	Karo	(*Pittosporum crassifolium*) - thick leafed	
(p)	7.	Tarata, Lemonwood	(*Pittosporum eugenioides*) - leaves glossy, light green, lemon scented	
(p)	8.	Taraire	(*Beilschmiedia tarairi*) - branchlets rusty tomentose, oval leaves, glaucous beneath	
(p)	9.	Whau	(*Entelea arborescens*) - large leaves, crenate and serrate, capsules with long bristles	
(p)	10.	Karaka	(*Corynocarpus laevigatus*) - smooth glossy leaves, orange berries	
(op)	11.	Kawakawa	(*Macropiper excelsum*) - with heart-shaped, peppery leaves	
(p)	12.	Puka	(*Griselinia lucida*) - glossy leaves, base very unequal	
(p)	13.	Kapuku, broadleaf	(*Griselinia littoralis*) - leaf base less unequal. Roadside planted; geographically out of place	

Not illustrated:

(p)	Toru	(*Toronia toru*)- bronze lanceolate leaves
(p)	Pukatea	(*Laurelia novae-zelandiae*) - with kahikatea bottom of Sandford Street
(p)	Maire Tawake	(*Syzygium maire*) - swamp maire - two planted on Nature Trail


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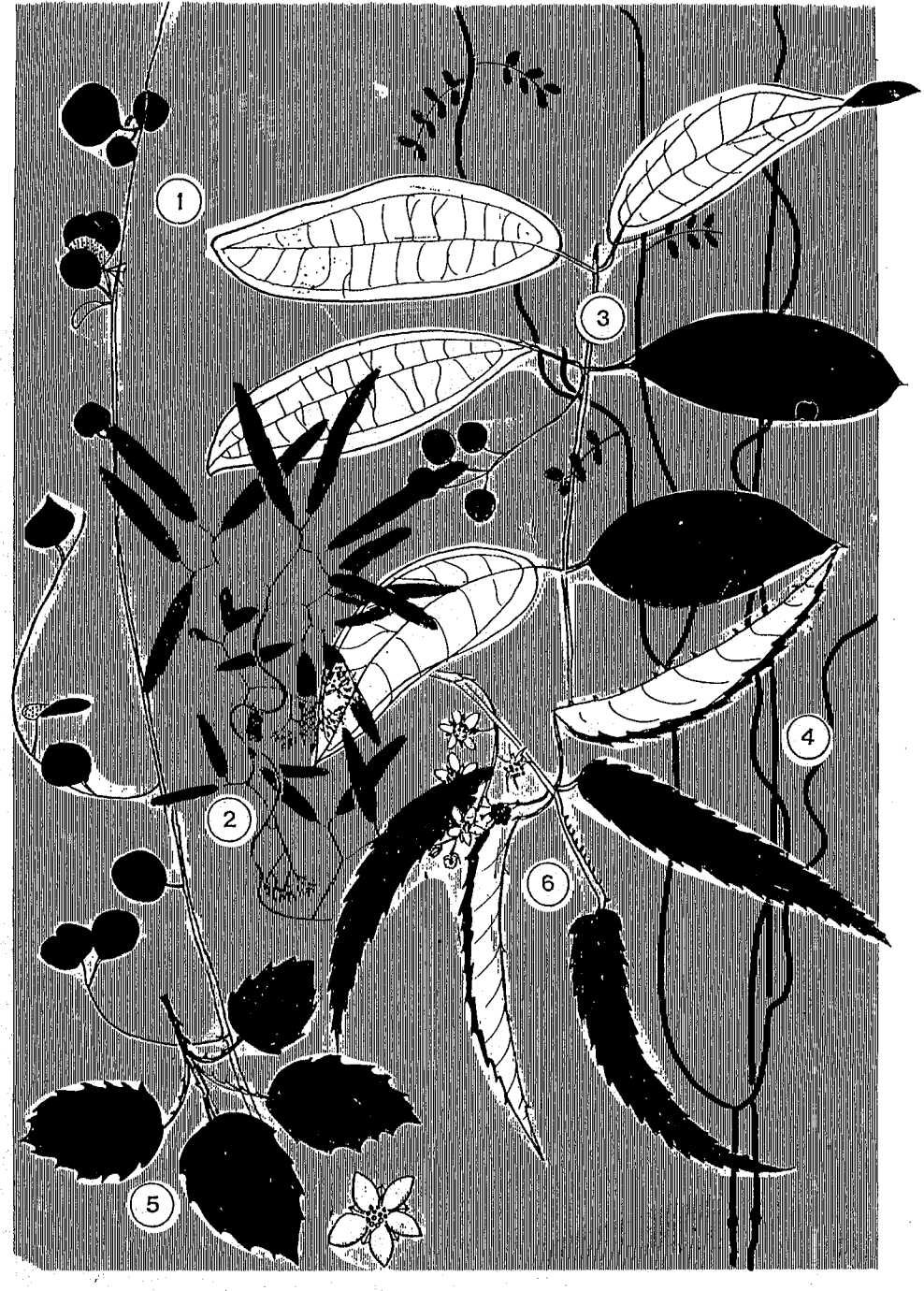


CLIMBERS & LIANES

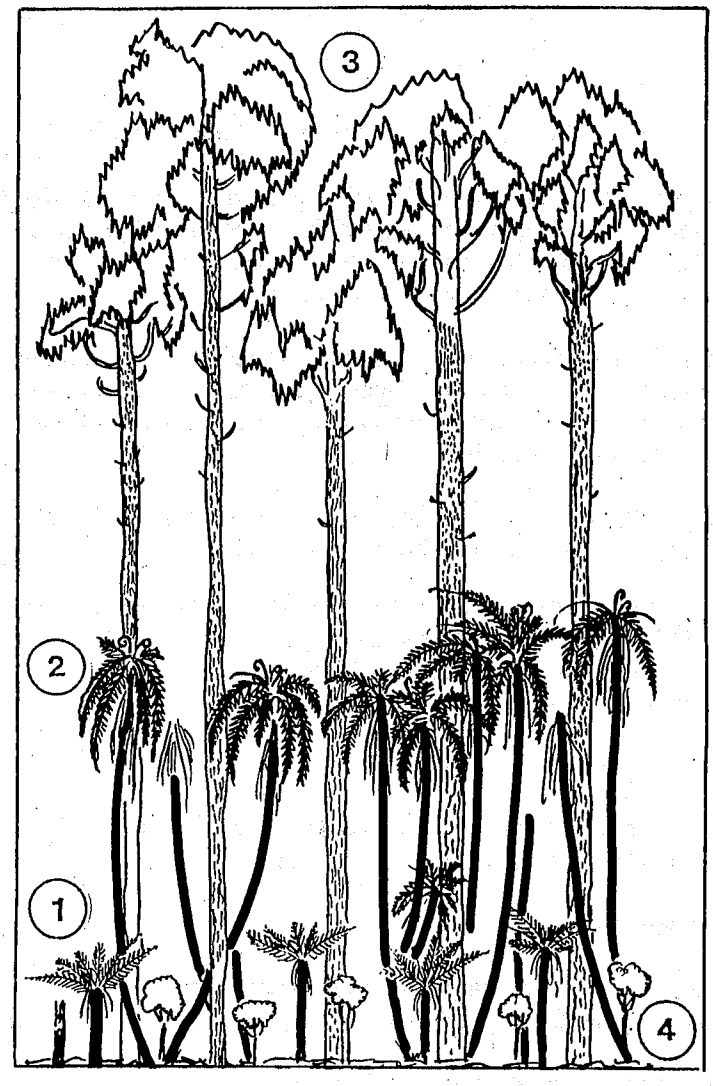
Perching epiphytes and orchids have not yet arrived in the bush. Nor are there any climbing rata, save for one sighting of a tiny *Metrosideros perforata* on a mamaku trunk (1993). The large vines are, however, well established, with NZ Passionfruit (confined to one planted specimen at the Nature Trail entrance) mature and luxuriant. *Clematis paniculata* is common and spectacular in its spring flowering, as is the native jasmine (*Parsonsia heterophylla*) though harder to see. Supplejack is recognised from its long smooth cables. Important climbing vines are the two lawyer species (*Rubus*) and streamers of *Muehlenbeckia complexa*. With its intricately subdivided single 'leaves', mangemange (*Lygodium articulatum*) is a common climbing fern.

			N.T. Peg
1.	Pohuhue	(*Muehlenbeckia complexa*) - compact masses, or climbing vine	42,45
2.	Mangemange	(*Lygodium articulatum*) - our only twining fern with long vine-like mid-ribs of the fronds.	42
3,4	Supplejack	(*Ripogonum scandens*) - pointed-ovate leaves, red berries	40
5.	Bush Lawyer	(*Rubus australis*) - smaller ovate leaves	
6.	Bush Lawyer	(*Rubus cissoides*) - leaflets lanceolate, sharply serrate	16

				N.T. Peg
	1.	NZ jasmine	(*Parsonsia heterophylla*) - white flowers & variable juvenile leaves. 2. Flower. 3. Climbing habit. 4. Juvenile leaf shapes. 5. Seed capsules.	8
	6.	Puawhananga	(*Clematis paniculata*)Large white flowers - sexes separate. 7. Feathered fruits. 8. Male flower. 9. Female flower. 10. Climbing habit.	35,70
(p)	11.	NZ passion fruit	(*Passiflora tetranda*) sexes separate small orange fruit. Over mahoe on right of Nature Trail entrance.	

GROUND FERNS

			N.T. Peg
1.	Pukupuku	(*Doodia ~~media~~ australis*) - common ground fern, tufted, new fronds pink	
2.	Gully fern	(*Pneumatopteris pennigera*) - in wet places, bright green, succulent	19, 45
(p) 3.	Manamana Hen and chickens	(*Asplenium bulbiferum*) with small adventitious plantlets	
4.	Umbrella fern	*Sticherus cunninghamii*, scarce on boundary trail	
5.	Kiokio	*Blechnum* ('Black spot') Broad pinnate fronds, often covering banks.	42
6.	Common maidenhair	(*Adiantum cunninghamii*) - creeping rhizomes, shining stems, sori in marginal notches	34
7.	Shaking brake	(*Pteris tremula*) - Rhizome not creeping and fronds thinner than bracken	25
8.	Kidney fern	(*Trichomanes reniforme*) - finely delicate kidney fronds	



TREE FERNS

The three species in the park are

		N.T. Peg
Mamaku or black tree fern	(*Cyathea medullaris*) - crown drooping, and black trunk with oval scars of the fallen fronds	46, 50, 52, 69
Ponga or Silver Fern	(*Cyathea dealbata*) - pure white beneath. Fronds rise before spreading. Dead frond bases remain on trunk.	2, 17, 52
Wheki	(*Dicksonia squarrosa*) - harsh foliage, tending to golden green: dead frond bases persist, as in silver fern	52

Silver Fern (1), at every stage of growth, is common and widespread. Mamaku (2) can be seen in handsome groves in valleys and streamside throughout the park. It reaches its peak on the Mamaku Track, where groves of ponga have grown tall under the protection of *Pinus pinaster* (3). Their luxuriant state is one of the positive spinoffs from the presence of pines. Elsewhere ponga growing out in the open are increasingly dying, perhaps due to climate variation where they are growing unprotected.

From the needle and frond-strewn floor, an initial community of natives is coming back that will fill the gaps with the demise of the pines, mainly mapou (*Myrsine australis*) (4) and hangehange (*Geniostoma rupestre*), but kohekohe, kanuka and totara are also establishing themselves.

CLIMBING & EPIPHYTIC FERNS & FERN ALLIES

The largest leafed epiphytic fern common on old trunks is *Phymatosorus pustulatus*. Hardly like a fern at all is the smaller 'leather leafed' *Pyrrosia eleagnifolia*. The park has three epiphytic species of spleenwort: *Asplenium flaccidum*, *A. oblongifolium* and *A. polyodon*. *Blechnum filiforme*, changing its leaf shape as it climbs up from the ground, is very common.

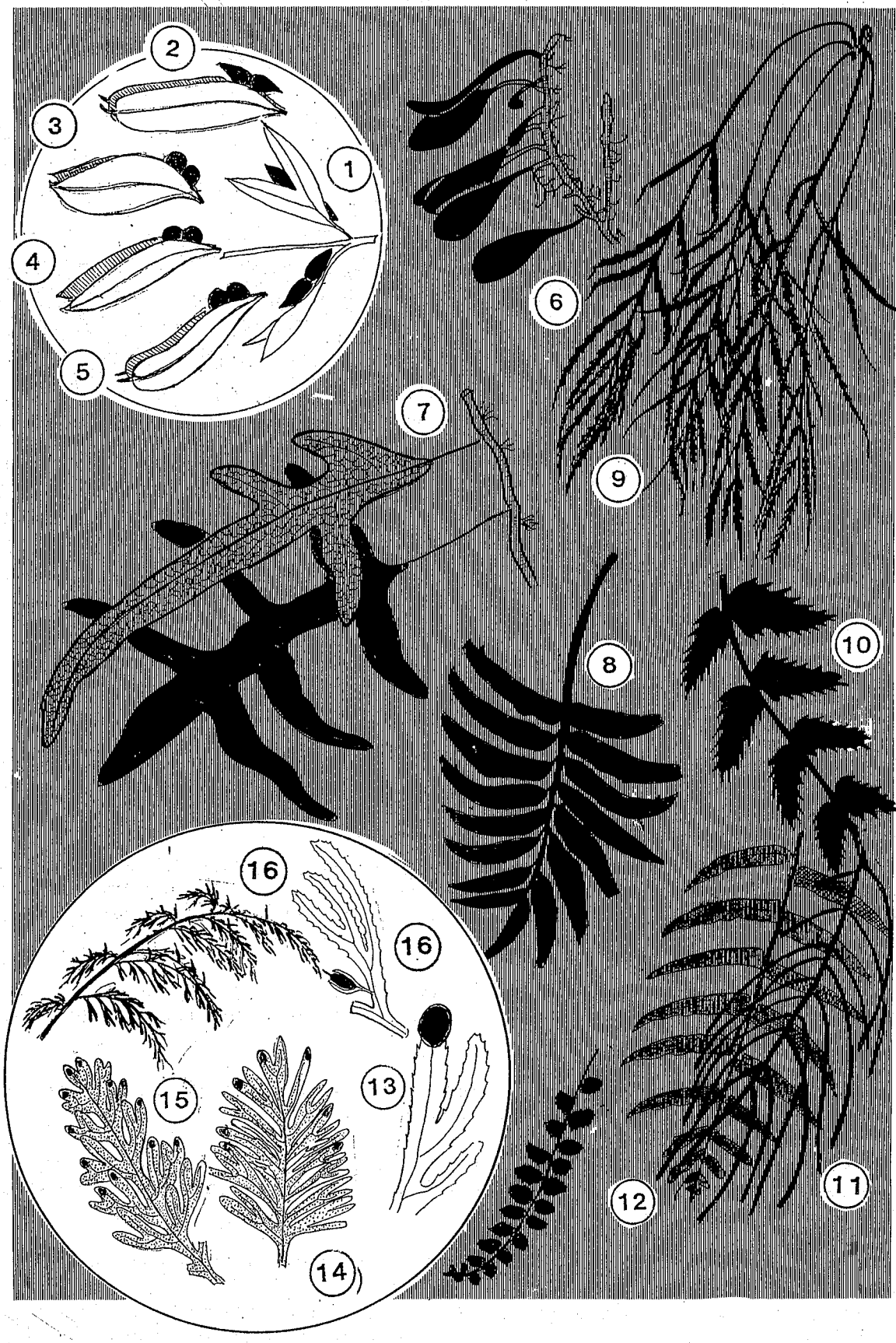
The filmy ferns *Hymenophyllum* are common on tree ferns along the moister Stream Track on the Nature Trail. Four have been recorded: the soft-falling, finely toothed *H. multifidum* differing from *H. bivalve* in the site of the sporangium. *H. rarum* and fan-shaped *H. flabellatum* both have smooth margins. (*H. bivalve* is an unusual find for Auckland).

Of the primitive 'fern ally' *Tmesipteris*, all four species are present in the bush, common on tree fern trunks on the Stream Track. To help identify them we offer a key:

A	SPORANGIA POINTED (right along the stem) stems sometimes partially erect, leaves spiralled with long spiny tips	TANNENSIS
AA	SPORANGIA ROUNDED	
B	Stems undivided, leaves flattened in one plane, fairly short, with terminal leaflet. Leaves relatively shiny	LANCEOLATA
BB	Stems with spiralling leaves	
C	Stems often very long and arching and may branch. Leaves dull. Sporangia usually throughout stem.	ELONGATA
CC	Leaves shiny green, sigma-shaped, with long spiny tips. Sporangia usually unequal in size, generally on upper part of stem	SIGMATIFOLIA

N.T. Peg

1.	*Tmesipteris*	Placement of sporangia on forked leaf; 2. *T. tannensis*; 3. *T. lanceolata*; 4. *T. elongata*; 5. *T. sigmatifolia*	38-45
6.	Leather-leaf fern	(*Pyrrosia eleagnifolia*), climbing, with thick oval leaves, reddish hairs beneath	
7.	Kowaowao, Maratata	Hounds-tongue (~~*Phymatosorus pustulatus*~~ *Microsorum pustulatum*) Bright green-lobed fronds with netted veinlets	34-38
8.	Shining spleenwort	Huruhuru whenua (*Asplenium oblongifolium*)	38
9.	Raukatauri	(*Asplenium flaccidum*) narrow limp hanging fronds	43
10.	Petako	(*Asplenium polyodon*) - sickle-shaped segments with two sides unequal	4,43
11.	Thread-fern	(*Blechnum filiforme*) climbing fronds and long and pointed fertile fronds	
12.	Thread-fern	Segments of rounded ground fronds	
13.	*Hymenophyllum bivalve*	14. *H. flabellatum*; 15. *H. rarum*; 16. *H. multifidum*	38, 4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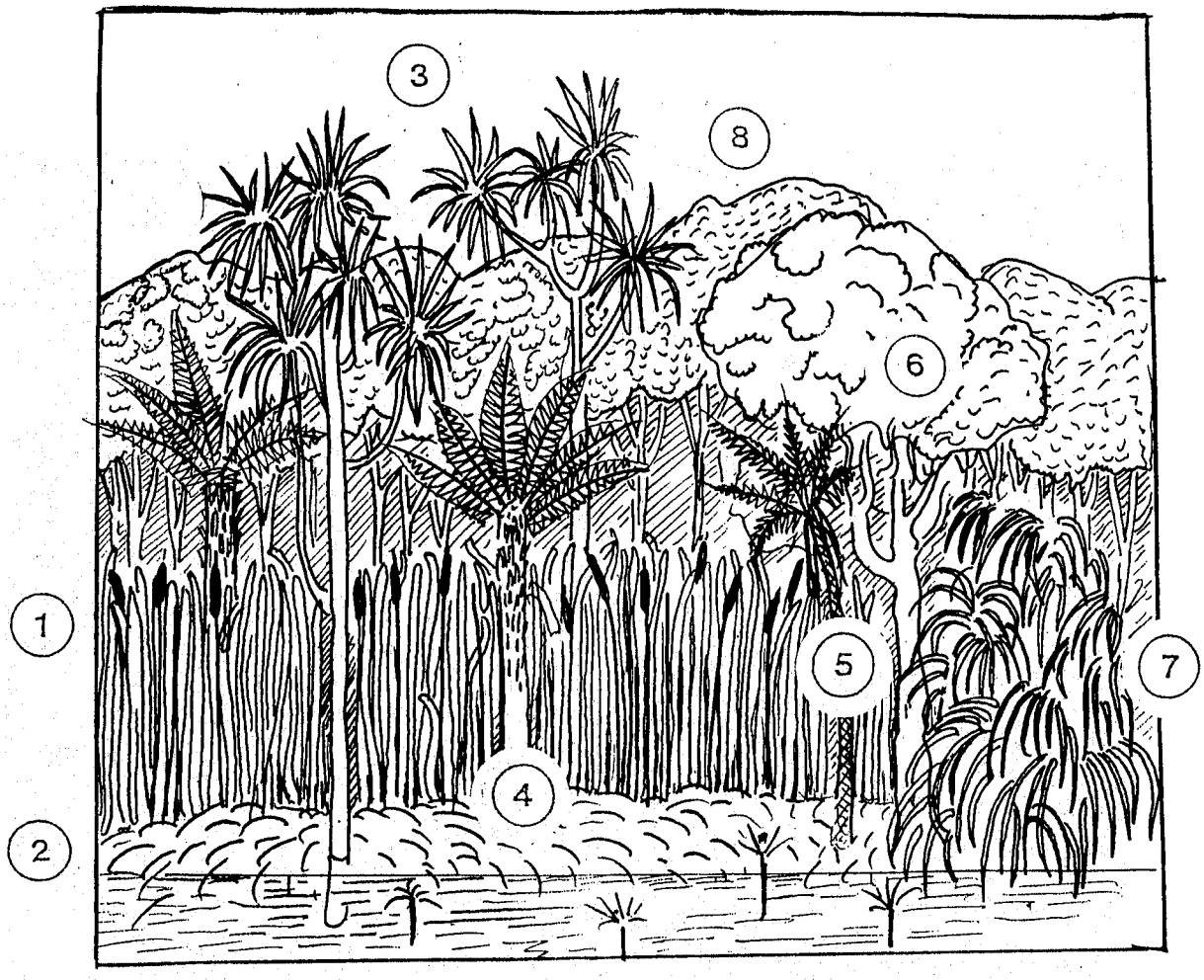


THE SWAMP & THE LARGE MONOCOTYLEDONS

Flanking the Kohekohe Trail, where the gum-diggers' huts were once sited, is the stream course widened into a considerable swamp. This is dominated by a good raupo bed (*Typha orientalis*) (1) that is fast increasing with the elimination of ginger.

The immediate track edge has *Carex lessoniana* and *Cyperus eragrostis* (not native). The native cyperus (*C. ustulatus*) larger, with black seed-heads, is also present. This ground-cover vegetation has come in after the removal of ginger, and will largely give way to the young seedlings already growing on the rotting ginger rhizomes. The Carex bed is shown in the foreground (2).

The tall profile of the swamp is cabbage tree (*Cordyline australis*) (3). Silver tree ferns (4) are common, along with mamaku and clumps of *Dicksonia squarrosa* (5). The large trees here are mostly mahoe (6) and putaputaweta.

Freycinetia banksii (kiekie) (7) is taking advantage of the removal of the ginger, and may well become an impenetrable thicket. Tall manuka (8) grows behind.

Elsewhere in the bush, two other *Cordyline* are found: the dwarf *C. pumilio* and - on the northern boundary of the Nature Trail - a clump of *C. banksii*, both with large sprays of sweetly scented flowers in summer.

Perching lillies (*Collospermum*) are absent, but one *Astelia trinerva* has been found at ground level. Blueberry (*Dianella nigra*) is common at the sides of tracks, while *Libertia ixioides* has been planted at the bush edge, along with renga lily (*Arthropodium cirratum*). Nikau (*Rhopalostylis sapida*) has been planted along the Stream Track of the Nature Trail and elsewhere. Flax, both *Phormium tenax* and *P. cookianum* has been planted extensively to seal the bush edges.

				N.T. Peg
	1.	Ti Ngahere	(*Cordyline banksii*) - a seldom branched small cabbage tree, wtih wide leaves drooping at the tip	69
(op)	2.	Cabbage Tree	Ti (*Cordyline australis*)	20
	3.	Ti Rauriki	(*Cordyline pumilio*) - stemless or up to 1m.	
	4.		Growth habit	25
(p)	5.	Tukauki	(*Libertia ixioides*) - a native iris, planted on bush edges	
	6.	Raupo	(*Typha orientalis*) - in the swamp - bull-rush	
	7.	Blueberry, Turutu	(*Dianella nigra*)	
	8.	Kiekie	(*Freycinetia banksii*) - a scrambling climber with serrate cutty edges. 9. Flower	26
(p)	10.	Nikau	(*Rhopalostylis sapida*) - planted on Valley Track.	45
(p).		Renga Lily	(*Arthropodium cirratum*) - planted at bush margins - not illustrated	
(p).		NZ Flax	(*Phormium tenax and P. Cookianum*) - planted at bush margins	

ORCHIDS & OTHER GRASSLAND HERBS

Outside the bush, ground orchids are a special feature of the acid clay. The commonest species, every year abounding from October to January is *Microtis unifolia*. The strap-leafed *Thelymitra pauciflora* can generally be found in bud or flower in October/November. *Th.longifolia*, with white or pink flowers, is found more scarcely, in some years, along track edges with manuka.

Uncommon, but typical on hard clay banks is the tall and handsome *Orthoceras novae-zeelandiae.*

Some dicotyledonous herbs are also common on sour grassland. Foremost in clay is the small, pink-flowered sundew (*Drosera auriculata*), catching insects with its sticky glandular hairs. Tall blue-flowered NZ harebell (*Wahlenbergia gracilis*) is common on banks. The bright, pink-flowered gentian (*Centaurea erythraea*) is abundant, and on wetter ground grows the Scrophulariacean *Parentucellia viscosa* (tar-weed), with sticky foliage and yellow flowers.

A small common sedge on semi swampy clay is *Schoenus apogon.*

GROUND ORCHIDS OF THE BUSH

The scarcer orchids come and go. Few species can be guaranteed to be found year by year.

The common species to be seen regularly are *Pterostylis gramin*ea and *Pt. banksii* and *Acianthus sinclairii*

			N.T. Peg
1.	*Corybas oblongus*		45
2.	*Pterostylis trullifolia*		11
3.	*Pterostylis banksii*	Frequent, bush interior (Oct-Nov)	44
4.	*Pterostylis graminea*	Very common amongst manuka (Oct-Nov)	5
5.	*Chiloglottis cornutum*		11
6.	*Acianthus sinclairii*	On moist banks Kokekohe Track	
7.	*Acianthus sinclairii*	Detail of flower	

1.	*Orthoceras novae-zeelandiae*	Uncommon on clay at bush edge (Jan)
2.	*Thelymitra longifolia*	Uncommon but seen some years - flowers white or pink
3.	*Thelymitra pulchella*	Large striking flowers held for some days, deep blue or lavender - in the bush
4.	*Thelymitra pauciflora*	Blue to pink - grasslands and path edges (Oct/Nov)
5.	*Microtis unifolia*	Abundant in open grasalands
6.	*Drosera auriculata*	Sundew - glandular insect-catching leaves and small pink flowers - wet banks
7.	*Lobelia anceps*	Flowers pale mauve or white - bush paths or grassed areas
8.	*Parentucellia viscosa*	'Tar-weed' - sticky foliage and pale yellow flowers on acid grassland
9.	*Wahlenbergia gracilis*	NZ Harebell - tall blue or white flowered
10.	*Centaurea erythraea*	A small bright pink gentian - grassland

SEDGES & GRASSES

The 'cutty-grasses' *Gahnia xanthocarpa*, *G. setifolia* and *G. lacera* are the largest, most conspicuous sedges. The largest *Carex* is *C. virgata*, while *C. lambertiana*, *C. dissita* and *C. lessoniana* are all frequent. *Cyperus ustulatus* and the smaller adventive *C. eragrostis* are both seen on swampy ground.

Familiar at the track sides are *Uncinia uncinata* and *Morelotia affinis*, with *Baumea juncea* at the bush margin. *Schoenus tendo* (see page 10) is common, mainly on the Boundary Track. The two common native grasses are *Microlaena avenacea* and *Oplismenus imbecillus*.

SEDGES: (Cyperaceae)

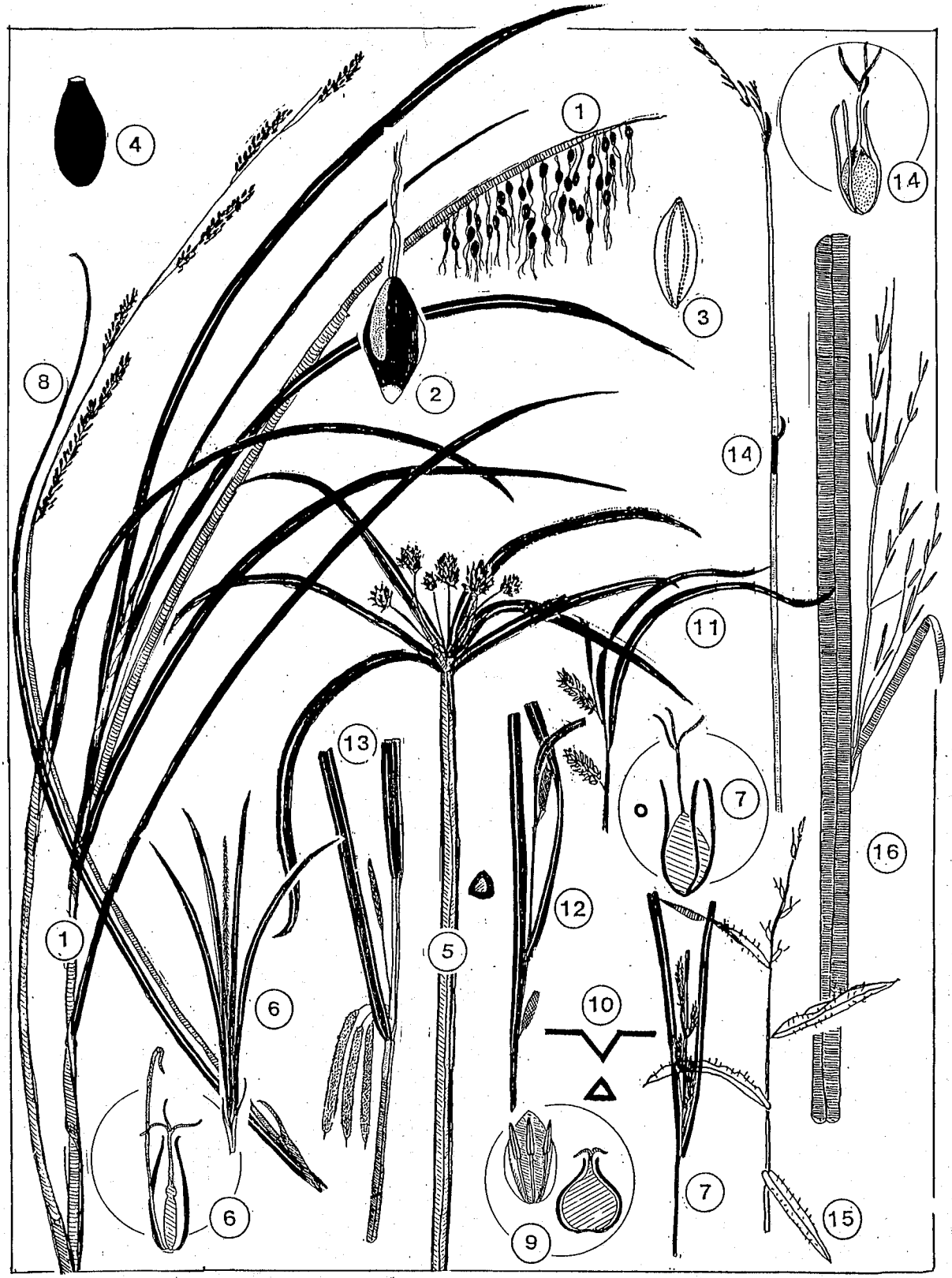
			N.T. Peg
1.	*Gahnia*	Growth habit	
2.	*G. xanthocarpa* (nut)	(Black)	
3.	*G. setifolia* (nut)	(Brown or yellow)	
4.	*G. lacera* (nut)	(Black)	
5.	*Cyperus ustulatus*	Large black seed-heads	
	Cyperus eragrostis	Smaller, more plentiful - green seedheads - adventive	
6.	*Uncinia uncinata*	With flower (inset) - stiff tufts recognised by hooked seeds	33
7.	*Morelotia affinis*	In harsh tufts, flat-leafed, grass-like	54
8.	*Carex virgata*	Very tall, common on swampy ground	23
9.	*Carex*	Male and female flowers	
10.	*Carex*	Leaf and stalk section	
11.	*Carex dissita*	Short spikes and narrow leaves	23, 31
12.	*Carex lambertiana*	Stiff, upright spikes	
13.	*Carex lessoniana*	Leave broad and folded, stems triangular, with long drooping spikes	23, 45
14.	*Baumea juncea*	Thin, upright cylindrical stems	

GRASSES (Gramineae : Poaceae)

15.	*Oplismenus imbecillus*	With pointed leaves, like a tiny bamboo, on bush floor	70
16.	*Microlaena avenacea*	Oat grass, flat, softish blades	31

Rushes (Juncaceae) (not illustrated)

Juncus prismatocarpus	Flat stems, cross-septate within
Juncus acuminatus	Leaves terete (onion-like), stems sparsely septate
Juncus caespiticius	Grassy leaves, and compact, globose heads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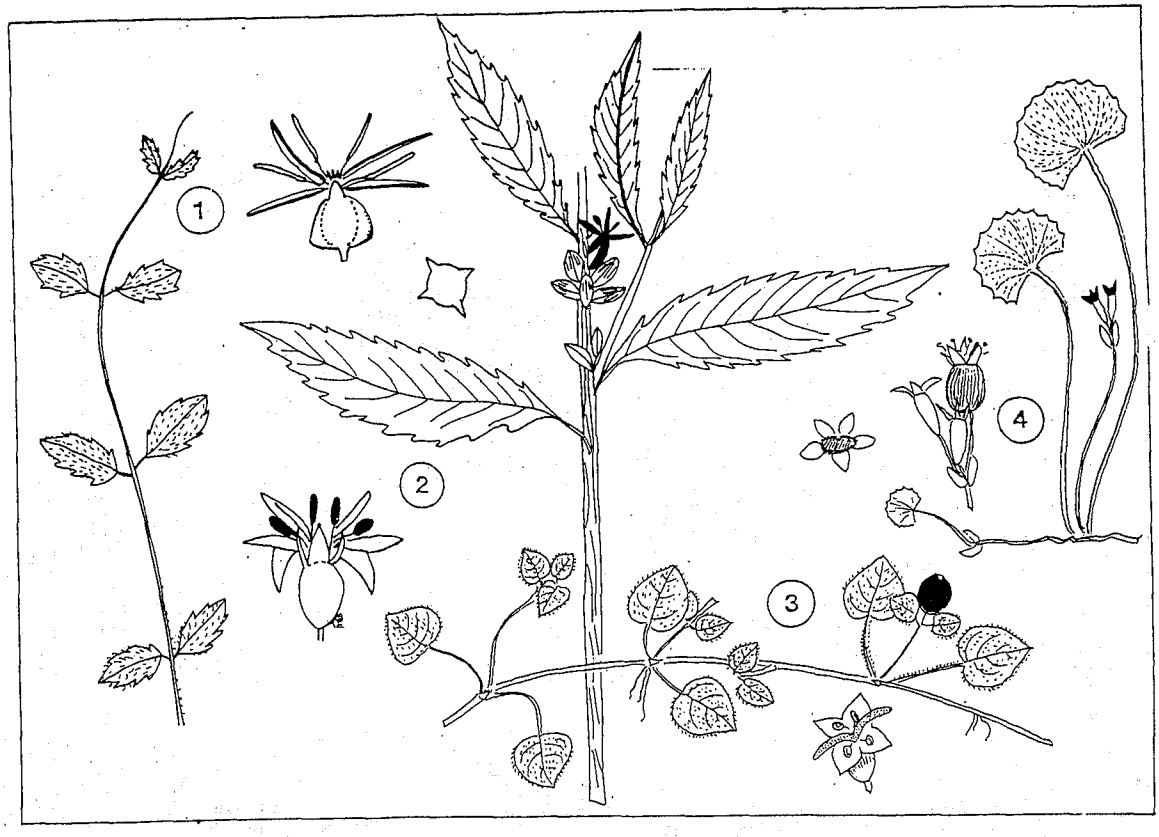
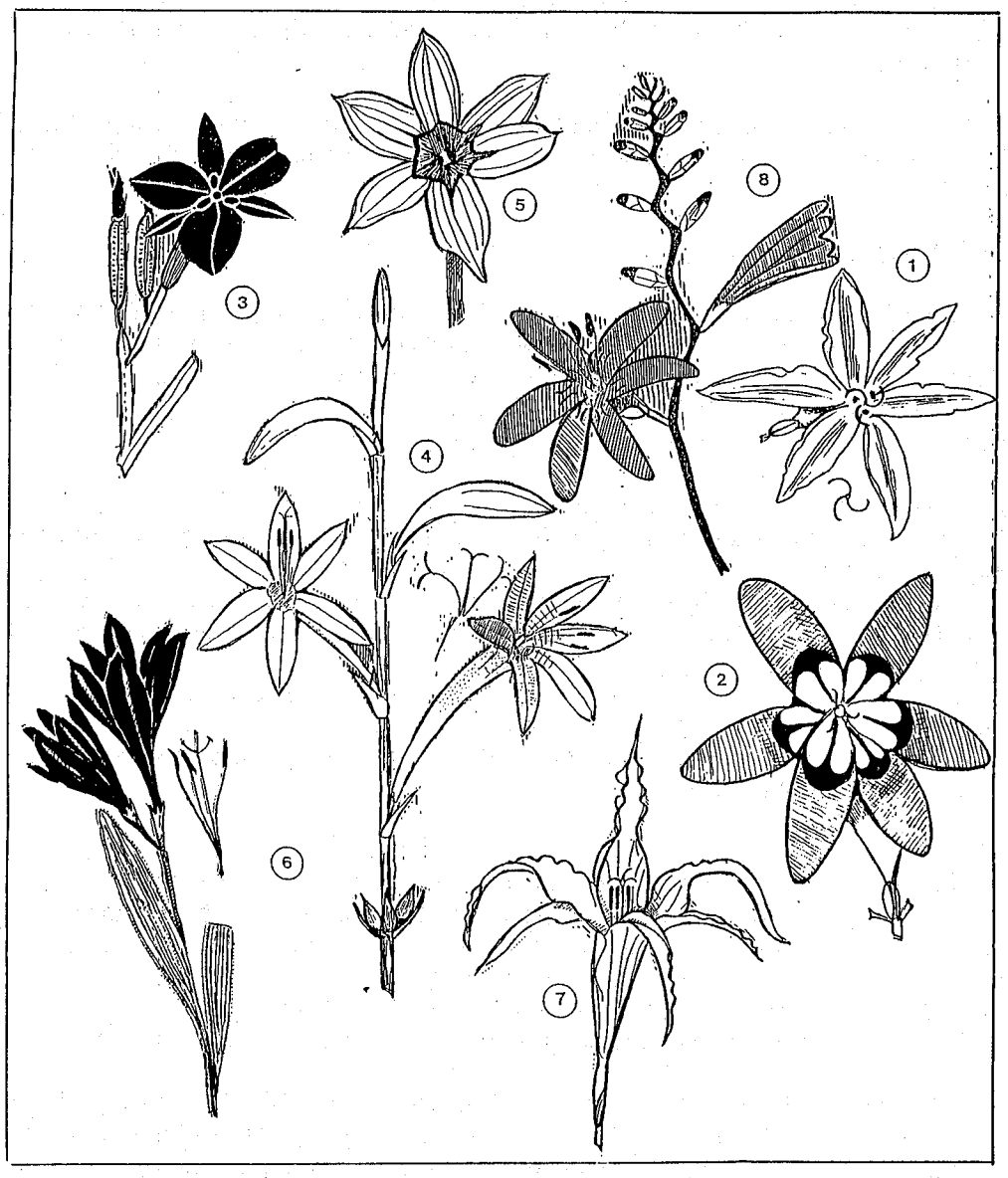


HERBS OF THE BUSH FLOOR

1. *Gonocarpus incanus* - scrambling, on sour soil
2. *Haloragis erecta* - in shaded places - 4-sided stems
3. *Nertera dichondrifolia* - creeping, forming mats, small red berries
4. *Centella uniflora* - kidney-shaped leaves, in shade
(flowers shown with each)

1.	*Sparaxis bulbifera*	(Sept-Oct) - wild sparaxis, pale yellow, very abundant.
2.	*S. tricolor*	Colourful garden escape.
3.	*Aristea ecklonii*	A dwarf iris - bright blue - simulating a carpet of bluebells (Oct/Nov)
4.	*Watsonia hybrids*	Pink and white groves in gullies and grasslands (Oct/Nov)
5.	*Sisyrinchium iridifolium* (American)	In three floral forms of distinct sizes. Usually Nov. but much scarcer than the rest - grasslands.
6.	*Babiana stricta*	Deep purple, appears in a few patches.
7.	*Gladiolus undulatus*	(Dec/Jan) - grasslands and roadsides
8.	*Crocosmia x crocosmiiflora*	Commonly called montbretia - S. African - bright scarlet (Jan) (hybrid)



THE SOUTH AFRICAN BULBS

At the turn of last century, when a regular shipping route existed from the Cape, introduction of bulbs and corms in soil and ballast was continually possible. Today in the South African Iridaceae in the open grasslands and round the margins of the bush, we have an interesting legacy of this era. These spring and summer adventives (that have also attained coloured illustration in Vol. III of the New Zealand Flora) form a seasonably attractive ground cover.

The grass is left unmowed through the winter and spring to allow their swathes of colour to appear in timely sequence.

They are numbered in order of seasonal appearance.

PINES

Nowhere in the park can we be unaware of pines. Whether or not by conscious design, some five species were introduced in the 1940's and perhaps before. There is today a good opportunity to recognise the characters and distinct growth form of an element of today's New Zealand flora that ought not to be disdained.

Their worst effects in bush invasion have been alleviated by sustained work, and towards the golf course boundary the fine stature of the black tree fern groves is owed entirely to the protection of tall, straight *Pinus pinaster*.

The distinguishing features of our five species can be briefly set out:

1. *Pinus radiata* - in unmanaged state a unconfined tree with shaggy head, and heavy branches radiating in all directions, often low to the ground on a broad-based tree.
   Cones: plump, wide-based, with hemispheric scales, tightly attached.
   Needles: in 3's, 12cm, rich blue green
   Bark: rough, deeply fissured

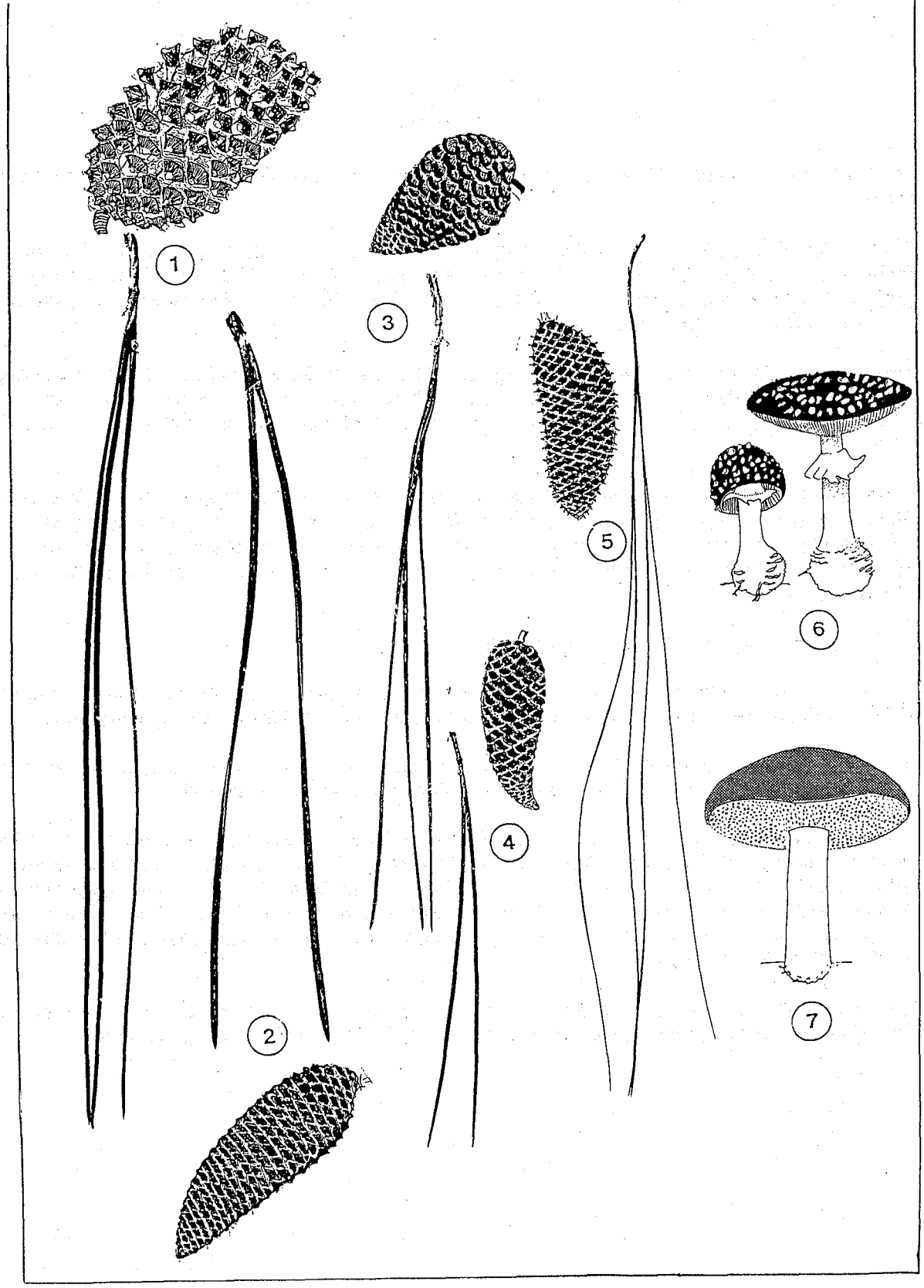
2. *Pinus pinaster* (= *P. maritima*) - S. Europe and Mediterranean.
   In a group near the tennis course, and a bigger planting flanking the golf course and along the Mamaku Track.
   Tall, straight and slender-trunked, with a spreading crown. Growing much larger here than in the Mediterranean, where used extensively as a street tree, with decorative umbrella-shaped crown much lower to the ground.
   Cones: larger, more slender than *radiata* - sometimes curved.
   Needles: in 2's, 16-18cm blue green
   Bark: very decorative, smooth, with shiny mosaic of mahogany-brown where top has flaked off.

3. *Pinus ponderosa*: NW American - several specimens below the tennis courts on grass slopes. Crown almost pyramidal, decorative, shining silver in the sun.
   Cones: big and oval, up to 20cm, leaving bases attached when they drop off. Light brown scales, flaring when open.
   Needles: long (20cm) in radiating groups of 3 - yellowish green
   Bark: flat, irregular, rectangular scales, jig-saw-like, reddish-orange.

4. *Pinus elliotii*: (Slash Pine) At top end of Nature Trail, by the 12th green, bounding one leg of the old Golf Club lease. A handsome tree, tall and conical in shape.
   Cones: slender and shining reddish/brown before they open, each scale with a distinctive prickle.
   Needles: in 2's, long (18-20cm) yellow-green.
   Bark: Loose and flaking in long strips, not actually falling off.
   Silvery gray, in some lights pink-tinged.

5. *Pinus patula*: (Mexico) - near Beach Road, where the stream leaves the park - a single specimen - tall and graceful, weeping, with fringes of drooping needles.
   Cones: small, pointed, in groups of 4, slightly hooked backwards, greyish - scale surface flat, younger ones with a little spine.
   Needles: Fine and limp (30cm) in groups of 4.
   Bark: Very distinctive, in thin, irregular plates, easily detaching.

Two other pines have been planted on grass slope below the tennis courts (1992/93)
Pinus coulteri - the 'big cone'
Pinus pinea - the 'stone pine'



1.	*Pinus ponderosa*	)	
2.	*Pinus pinaster*	)	
3.	*Pinus radiata*	)	Needles & cones
4.	*Pinus elliottii*	)	
5.	*Pinus patula*	)	

Two common fungi beneath pines:

6.	*Amanita muscaria*	Scarlet and poisonous (April-May)
7.	*Boletus (-Suillus) granulatus*	Edible, brown on top, pore lemon yellow. (April-May)

CLIMAX

What will Centennial Park one day look like if conservation care goes on and regeneration moves to its climax?

We have left in Campbells Bay a last surviving gem of the old bush, detached from the park, and still primal and untouched. Lying in the gully between Channel View Road and Park Rise, it is being carefully preserved in the private ownership of the Wilcox family. Mr Ron Wilcox was for many years a Councillor and Deputy Mayor of East Coast Bays City.

This is without question the most precious fragment of bush left in Campbells Bay. To enter it is at once to envisage the future state of Centennial Park if all continues well. Its preservation is of major importance, serving as it does as an end-point of reference for the succession now being enacted in the park.

Close-spaced kahikatea, with mature shaggy heads, now reach up as high as 25m. in a principal canopy. There is a good sub-canopy, chiefly of old well-grown mahoe. Two species characteristic of rich-soiled coastal areas around stream-mouths are puriri and kohekohe, less evident on the gumland clay, higher and further back, on which Centennial Park is sited. There is also a shrub layer of luxuriant kawakawa.

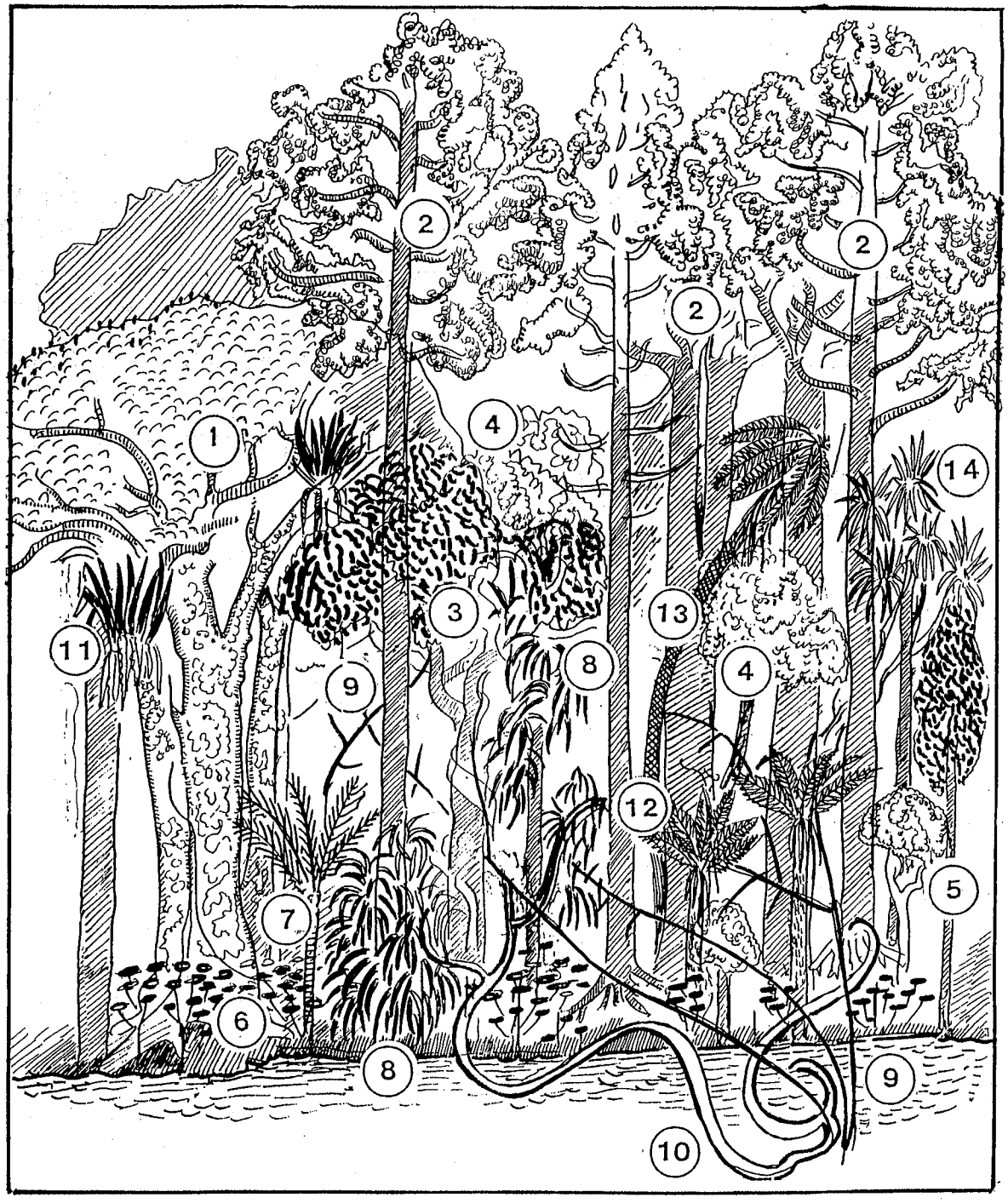
Further up the gully are a few well-grown kauri.

Typical of a dense mature forest are two big liane species, tangled supplejack and arm-thick hawsers of native passion fruit. Kiekie also flourishes, and large puriri carry the tank-lily, *Collospermum hastatum*.

The mature closed canopy shades a bush floor that has in many places become open and walkable, with many of the groundcover species and ferns in Centennial Park now absent.

To walk round this fragment of the original bush cover of Campbells Bay is to find the answers to things that have puzzled us. Centennial Park has a large mature kahikatea - a female, thought to have been growing out in the open on cleared or scrub land. We had not been able to find large kahikatea near enough for the pollen to be blown onto the flowers to enable her to colonise the stream bed area with her progeny, now quite large. It would hardly seem possible for this to have come from Smiths Bush or Awaruku. Now we know the answer.

This could also provide the answer to how the first known small plant of white climbing rata (*Metrosideros perforata*) has appeared in Centennial Park. The Wilcoxs' bush is full of it.



THE COMMUNITY STRUCTURE OF THE WILCOX BUSH
- a composite picture -

1. Puriri
2. Kahikatea
3. Kohekohe
4. Mahoe
5. Rewarewa
6. Kawakawa
7. Nikau
8. Kiekie
9. Supplejack
10. Native passion vine
11. Tank lily (*Collopspermum*)
12. Mamaku
13. Silver fern, ponga
14. Cabbage tree

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